CIENCE LIBRARY

DEC 22 1924

Graw-Hill Company, Inc.

December 20, 1924

Twenty-five Cents Per Copy

ENGINEERING AND MINING JOURNAL-PRESS

A CONSOLIDATION OF ENGINEERING AND MINING JOURNAL AND MINING AND SCIENTIFIC PRESS

Cripple Creek: An Inside Story—II

By N. E. Guyot

Marketing and the Mining Industries

By George J. Young

Analysis of Xanthate

First Published Method of Determining Its Purity

By W. S. Calcott, F. L. English, and F. B. Downing

Biography of Robert E. Tally

Old Town")

March, 1892

ugh this region
ted prospectors
y as 1874 it was
until 1891 that
ch ore deposits
discovered and
me established.
then, its mines
yielded almost
00,000 in gold

Always the same dependable service

S-A Unit Conveyor-Carriers are so well designed they require practically no attention. For months after leaving the factory they will run without re-greasing or maintenance.

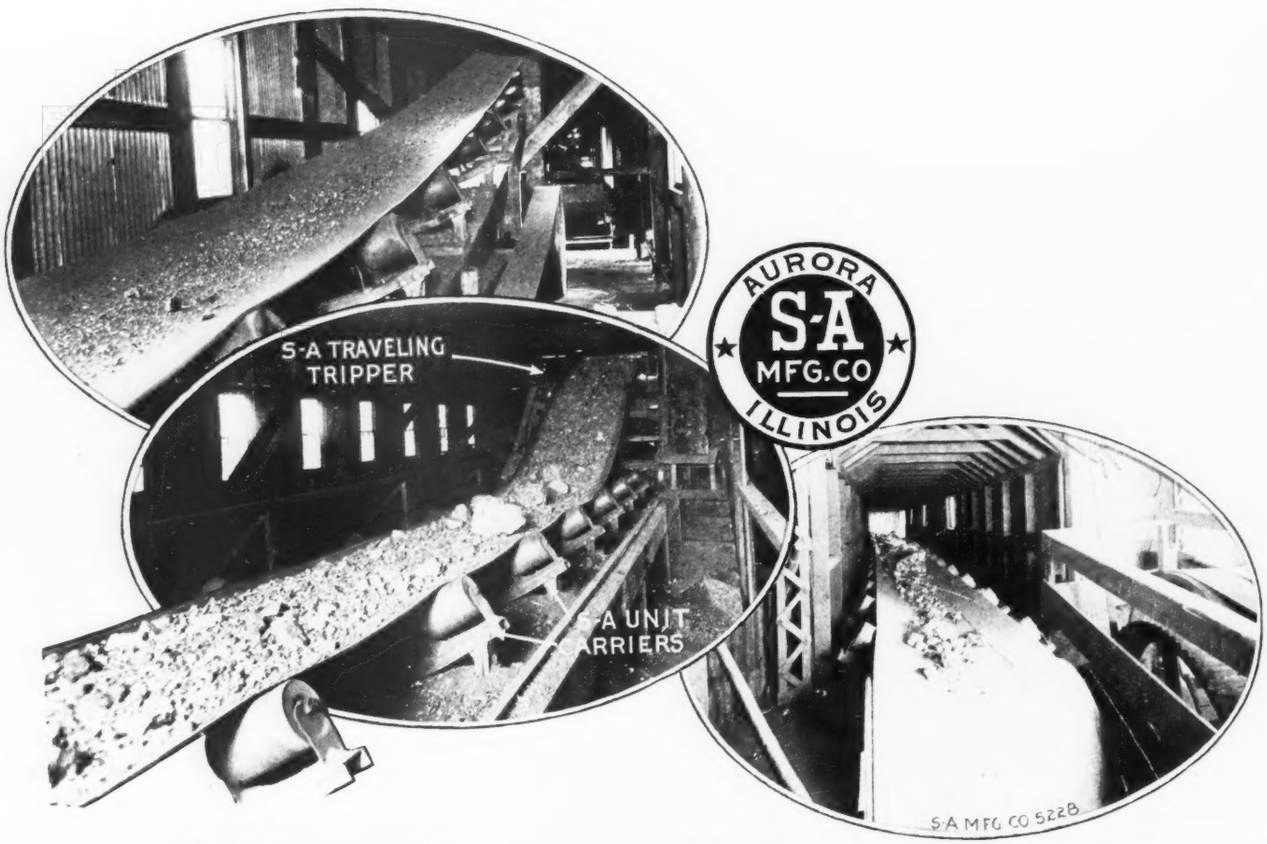
Continuous operation of a milling plant is essential to big production and the dependability of S-A Unit Carriers has for years been a great aid in the mining industry to greater production and lowered operating costs.

The all-steel construction, ball-bearings and excellence of materials and workmanship insure dependable, uniterrupted service under the most adverse conditions.

S-A Unit Carriers can be had in the regular type or with high pressure lubrication fittings. If you have a handling problem it will pay you to investigate the merits of S-A Unit Carriers.

STEPHENS-ADAMSON MFG. CO.

Aurora, Illinois



Stephens-Adamson

ENGINEERING AND
MINING JOURNAL-PRESS

JOSIAH EDWARD SPURR, Editor

Volume 118 | New York, December 20, 1924 | *Number* 25

A Market for All Minerals

OCCASIONALLY, in fact rather frequently, a subscriber writes to *Mining Journal-Press* with the request that it inform him just where he can sell some uncommon ore, semi-finished product, or refined metal. Numerous inquiries of this type, together with our replies, have been published in the Consultation department for the general interest attached to them. More often than not our replies must have seemed discouraging, for, so far as we could see, the outlet for many of the commodities has been decidedly limited. A peculiar and gratifying result of publishing these inquiries has been the entirely unlooked-for response from numerous individuals and companies stating that they are in a position to handle the product seeking a market. Thus we recently published inquiries about the market for bismuth, cobalt, antimony, and tin ores, each of which drew responses from a surprisingly large number of people interested in buying those products.

A short time ago we were asked about the market for wulfenite, a lead molybdate, and learned from a large producer of molybdenum products that the low molybdenum content of this mineral and the relatively high cost of recovery made the use of wulfenite impracticable and unprofitable, which seemingly indicated that the prospects of selling wulfenite were slim. A market does exist for the mineral, however, as we discovered subsequently, through a letter from a French smelting company which is in the market for the mineral, and the representative of which wrote to us, asking if we could put him in touch with a suitable supply. Probably the mineral is treated to recover not only the molybdenum but the lead content as well. This leads us to remark that foreign smelting and refining companies, particularly German and French companies, seem especially interested in buying the uncommon ores and minerals. The hopes of miners should not be unduly raised, though, that almost any mineral can be readily sold; for it takes an exceptionally rich ore to stand heavy transportation charges such as are involved in a shipment to Europe by rail and water. Nevertheless, our experience with these products would show that there is a market for all minerals, but that patience and constant searching are required to find it for many of them.

Russia and Manganese

PRESS DISPATCHES from Russia give an account of keen competition among American and European capitalists for control of the manganese deposits of the Soviet republic of Georgia, in the Caucasus region. These deposits, perhaps the richest deposits of high-grade manganese in the world, have, especially since the war, been among the chief suppliers of manganese to this country as well as Europe. During the war America's principal supplies came from Brazil, supplemented by a domestic production which resulted from the high pressure of war conditions. The Soviet government of Georgia is now using these Caucasus manganese deposits as a bait in dealing with other countries. The mines were confiscated from the prewar owners, and "nationalized": having stolen them from their original owners, the republic proposes to dispose of them again to the highest bidder.

The New York firm of W. A. Harriman & Co. is reported as being among those seeking the concession: indeed, it was mistakenly reported recently that Harriman & Co. had secured it, a report that aroused adverse official utterance in England and in Germany. Germany, it appears, is hot on the trail of this manganese concession: and England naturally objects to the passing of the control of this strategically important reserve to any hands but her own.

At present the mines are exploited, under terms imposed by the Georgian Government, by many small companies—French, English, German, Greek, Armenian, Georgian: but the Georgian Government desires to place them as a monopoly in the hands of one group. The United States is now taking about one-third of the entire production of this region. While it is reported that the Harriman firm has excellent chances of securing this monopoly, German interests, through the Deutsche Bank, are making strenuous efforts to obtain it. The Ruhr draws from the Caucasus deposits nearly all of its manganese for its steel industries; and Germans see in the American effort for control, an American campaign to get control of German industry. The German Government and the British Government are actively backing up their nationals in the contest.

Since the manganese deposits are but a pawn in the hands of the Russian Soviet, their disposition evidently depends upon factors other than those mentioned. The Soviets have recently been playing a game of diplomacy intrigue as repellent as it is stupid. In turn England and France, after having been impelled by their more liberal elements to extend their hands to Russia, have withdrawn them with their fingers burned. America, guided by the wise counsel of its leading statesmen, has never given Russia this chance. Russia has dangled many baits of the type before American eyes, dependent upon recognition of the Soviets. But it has been abundantly proven recently that the plans of the Russian communists are treacherous; that while they are asking for recognition they are conducting extensive underground propaganda for world-wide revolutions and the overthrow of governments, whether monarchial or democratic: and in their place these ignorant fanatics dream of world-wide dictatorship of the proletariat—a

form of government analogous to the old fashioned South American dictatorships, now becoming not so typical.

Soviet Russia is an enemy of freedom, of democracy, of religion, of civilization. An ancient people, never more than half civilized, the Russians have practically destroyed their more intelligent classes: and the dregs dream of flowing over the Western world as did those ancient floods of men which swept from Asia and Russia and successively overwhelmed Europe, and wiped out the ancient culture of Greece and of Rome. This situation being all too evidently true, the civilized and progressive nations will not play into the hands of this ragged ruffian of a country, in any way: nor allow themselves to be pitted against one another by Soviet diplomacy. The Soviet demands loans from foreign countries—having repudiated former Russian loans; and intends to use this money in part in plotting against the governments which lend. Only stupidity and an over-eagerness for gain could be deceived by such impudent tactics.

The United States does not have large reserves of high-grade manganese, but it has vast amounts of low-grade manganese ore; and the progress which has been made since the war in adapting this to use in steel manufacture is very remarkable. Moreover, it has many sources of supply of high-grade manganese other than Russian.

Columbia Amplifies Its Engineering Curriculum

FOR TEN YEARS the Schools of Mines, Engineering, and Chemistry of Columbia University have been conducted upon a six-year basis: that is, the courses leading to the engineering degrees have been regarded as post-graduate courses for whose completion six years' residence was required. Recently, four-year engineering courses have been restored to the curriculum, and the program of the Schools has been so altered that the student can elect courses of four, five, or six years, each with its appropriate degree.

It has been an open secret that the six-year post-graduate program of the university has not attracted the number of engineering students which was expected when it was instituted, and for which the Schools are equipped. The contrast between the total engineering enrollment during the last few years and the large classes graduated under the old four-year system at Columbia and at other engineering schools has been striking. Considering the excellent facilities available for the pursuit of any engineering or scientific study at Columbia, this condition can only be described as a continuing loss of opportunity not only to the student but also to the university.

Doubtless many students have been deterred from taking a six-year course by its expense and by the postponement of entry into professional life. By shortening the courses without sacrificing any of the liberalizing features of the six-year program, Columbia has made a wise move. The restored four-year course leads to the degree of Bachelor of Science; it differs from the usual course in its relatively greater emphasis on applied science and engineering instruction, and is, in fact, as well as in theory, a training for engineers. The six-year course remains as before and leads to the appropriate engineering degree. The thorough grounding in fundamentals so essential in engineering education characterizes both courses, maintains the Columbia tradition, and must furnish the basis of all professional engineering work. If a student has learned to use mathematics readily, and if he has acquired the faculty of establishing correct premises and reasoning from them logically to accurate conclusions, he has received the foundation of his entire professional life.

A criticism which might be leveled at Columbia's restored four-year course is that two years of the necessary residence are spent under the administration of Columbia College rather than of the engineering schools themselves. Nevertheless, the change already made bids fair to restore much of the ground, in attendance and utilization of facilities, that Columbia has lost under its strict six-year program, and this without lowering the standard of instruction.

The Magmatic Stage of Nickel Ores

A SHORT ARTICLE by Messrs. Lindgren and Davy, in the June-July (1924) number of *Economic Geology*, has a broad significance that should be pointed out. Frequently features of wide importance are overlooked in the steady accumulation of what appears to be mere descriptive geologic writing. The article deals with the nickel ores of the Key West mine, in southern Nevada, which occur in Pre-Cambrian peridotite dikes which cut older gneisses. The ores are pentlandite, pyrite, and chalcopyrite, much (though not exactly) like the nickel ores of the Sudbury district in Ontario. The ores also contain platinum and palladium.

The authors have decided that the sulphides are truly magmatic, and crystallized as part of the rock (dike) fabric. They say, "This specimen is held to prove the late magmatic origin of the ore minerals. We believe that they formed part of the magma of the dike and consolidated as the last of the minerals of igneous origin."

Since the ore solutions constituted an integral part of the magma, they constituted an ore magma. The significant thing is the determination of the sulphide minerals as the latest composites of the magma to crystallize.

This type of ores was first defined as magmatic by Vogt, who believed that the metallic ores were the first to crystallize from the fluid magma and that they effected a segregation into workable bodies while the rest of the magma was fluid. These were the first ore deposits to be ascribed to "magmatic differentiation"; and the nickel ores in basic rocks were the most prominent type described by Vogt. A similar explanation was applied by Coleman and others to the Sudbury nickel ores, where the sulphide minerals were believed to have been the first minerals to crystallize and to have accumulated in the bottom part of the basic (norite) magma basin by settling through gravity.

On the other hand, J. E. Spurr, in "The Ore Magmas," stated his belief that, even in basic magmas, the ore minerals were not necessarily the first minerals to crystallize, but were more typically the last, in spite of their often occurring as isolated crystals embedded in the other minerals; and showed that this test of isolation and idiomorphism was no criterion, since it

has been shown that minerals may permeate an already consolidated rock and so crystallize. This conclusion was succinctly stated in a short paper ("The Origin of Metallic Ores by Magmation"):

"I question, indeed, the whole assumption that the metallic minerals—oxides, sulphides, and native metals—are necessarily or even generally among the first formed crystals from the igneous magma, as the petrographers have concluded, on which assumption Vogt's view of basic magmatic segregation is founded; on the contrary, I suspect that the metallic minerals, whether oxides or sulphides, are later than the rock silicates in general, and that the idiomorphic form of these oxides and sulphides, on which their greater age has been predicated, may be due to a special adaptability for migration, penetration, and replacement, which is characteristic of all the ore minerals. Thus there may result, according to my view, the various forms of metallic mineral deposition: isolated crystals of metallic oxides and sulphides disseminated in the igneous rock fabric; streaks or bands where these crystals are relatively concentrated; accumulations at igneous contacts, in the intruded rock and also in the intrusive rock; accumulations along and in fissures; and, under favorable circumstances, the accumulation of concentrated ore magmas, which act as individual submagmas, performing intrusion, and subject to successive migration, and splitting into more and more specialized types of submagmas. And I believe that these principles apply to all rocks, whether basic, siliceous, or intermediate."

These considerations range the ore deposits like the nickel deposits, characteristic of basic rocks, closely with other ore deposits, in that they are all crystallized as a late stage of magmation; this taking the place of the former view, which held that the ores like the magmatic nickel deposits were always the first consolidations from the magma, while most ore deposits were always "after-effects."

This example of the Key West mine is also one of those which illustrates the difference between ore magmas and hot waters. There is evidence of the action of hot waters after the congealing of the rock-ore magma, but these hot waters deposited no ore, although they did produce the replacement of the original silicates to chlorite, quartz, talc, and dolomite. Readers should compare, in this respect, the geology of the Edwards (N. Y.) mine, as reported by J. E. Spurr in *Mining Journal-Press*, issue of April 23, 1924, page 684, for another example of the marked distinction between ore magmas and hot waters, although in the latter case the hot-water activities preceded the injection of the ore magma.

Politics in the Universities

UNIVERSITIES, when one examines them in more or less detail, do not appear so serious as one expected. Their organizations are largely founded upon precedent. Gowns, caps, faculty senates, and other trappings, as well as professors and university presidents and deans, follow deep scratches in the bedrock of time that lead back to the ancient monasteries.

Blind people are encouraged to run by taking hold of a ring that encircles a long rope attached on either side of a runway. This gives direction. In a similar way the universities are attached to rings and ropes, but the individuals constituting them are not blind. They are quite human and open to all of the usual desires and possess many of the usual human failings; nevertheless, we naturally expect the standards of a university and of its teaching force to be vastly better than those of the everyday business organization and individual. Sometimes, however, suspicions are aroused. We begin to suspect that star-chamber methods may exist here and there; that there may be a degree of unfairness; that "politicos" may in some cases run affairs; that expediency may rule rather than ethical considerations.

The presidency of an educational institution is an important trust. It does not involve the proprietorship of the institution. Likewise deanship, headship of a department, and professorship, are trusts to be administered in a broad spirit of fairness alike to the institution and its dependents. Promotion to high office in such institutions should be predicated on achievement and character and not on the possession of a glib tongue, university politics, or outside interested sponsors. The policies of an institution should emanate from its strong men, its men of real worth and character, and not from the men who are so small as to play politics in a situation which demands candor and a sense of the ethical principles that should rule in an educational institution.

Sir Thomas Henry Holland

THE ELECTION of Sir Thomas Holland to the presidency of the Institution of Mining and Metallurgy in London will give keen pleasure not only to his numerous personal friends but to the members of the mining profession in many lands. He was graduated from the Royal College of Science in 1886, and three years later became assistant superintendent of the Geological Survey of India. From 1903 to 1909 he was Director of the Survey. Then for eight years he was professor of geology in the University of Manchester. In 1916 he was elected president of the Institution of Mining Engineers. During the war he was major in the Territorial Force; he was president of the Indian Munitions Board, and a member of the Governor General's Executive Council in India. During his varied and useful career he has received many honors, including several honorary degrees and fellowships in the Royal Society. At the present time he fills the important post of Director of the Imperial College of Science and Technology, which includes the Royal School of Mines. Sir Thomas has an engaging personality, he is a good speaker, a clear thinker, and a man of high ideals. We congratulate the members of our profession overseas in selecting one so well fitted to be their titular chief.

The Preaching of Geology

RECENTLY we referred to the broadcasting of the elements of geology in plain English, by Professor J. E. Woodman, over station WJZ, New York City. We are also informed that the same thing has recently been done from St. Lawrence University, Canton, N. Y. (station WCAD) by Professor Freeman F. Burr, of that institution. May the practice of preaching geology increase! Professor Burr requests anyone who hears him and is at all happy about it, to drop him an encouraging line.

Mine Managers of Note

Robert Emmet Tally

ROBERT E. TALLY is general manager of the United Verde Copper Co. The United Verde mine is one of the great mines of the world. To attain the position of the chief executive of a large mining organization is a noteworthy feat, and the progress made by Mr. Tally in arriving at this position is of general interest. He was born in Virginia City, Nev. From this historic mining environment he went to the University of Nevada, where he was graduated from the School of Mines in 1899. Thus the time interval under review occupies an even twenty-five years. At the time Tally was graduated, mining educators were discussing the need for mining graduates to supplement their college courses by work in mines. A judicious combination of theory and practice was advocated as the best foundation for success in the mining industry. Tally took this advice seriously, for he worked as a practical miner for seven years in many of the large mines of the Western mining states. Subsequently, he applied his knowledge of chemistry, geology, and engineering for three years, and thus rounded out his intimate contact with going operations. He entered the employ of the United Verde Copper Co. in 1907 as mine timberman. Within a year he was advanced to assistant mine superintendent and in another year to mine superintendent. Seven years thereafter, in 1916, he became assistant general manager, and in 1921 he was advanced to the position of general manager. During this period the production of the United Verde mine increased from 36,000,000 lb. of copper per annum (in 1907) to 100,000,000 lb. The facilities of the company have been greatly improved until they are now capable of sustaining a production of 150,000,000 lb. of copper a year. The old mining and reduction plant was crowded into a restricted space on a side hill near Jerome. The operating facilities were greatly cramped. The condition was remedied by building an entirely new mine plant on an area tributary to an adit which gave access to the two underground shafts serving the mine. A lower adit for the removal of the ore was constructed at Hopewell, and a crushing plant and transfer bins were erected. At Clarkdale a modern smelter and town were constructed. Railroad facilities between the mine, Hopewell and Clarkdale were greatly improved. In 1923, a new crushing plant was installed at the smelter, supplanting the Hopewell crushing plant. In the mine two important shafts, one for handling men and supplies and the other exclusively for ore, were sunk, and they connect the two main adits with the working levels. These shafts have been concreted and made fireproof. A systematic campaign of exploration and development greatly increased the ore reserves of the mine. In addition to the physical improvements of the property, the operating personnel has been thoroughly organized commensurate with the scale of operations. A bonus system of payment has been perfected and has practically eliminated labor discontent and materially improved efficiency. The United Verde was the first of the large metal mines to introduce mechanical ventilation and successfully to control underground temperatures by the use of large volumes of air. It was also one of the first companies to standardize on mounted and unmounted water drills. Carbide lamps were introduced to displace candles when the possibilities of illumination by carbide first became practicable. The electrification of the mine and smelter plants has been progressively developed. All hoisting, pumping and most of the underground haulage is now accomplished by electric power.

ROBERT EMMET TALLY

Tally has surrounded himself with an able and loyal staff. His organization reflects the whole-souled character of its leader. The initiation of a training school for the younger members of the mining organization is an especially commendable innovation. In addition, he has taken an active part in the work of the American Mining Congress. As a member of the Western Board of Governors, he frequently attends its meetings and aids in maintaining a wise policy. He is a member of the Institute and belongs to several clubs in Arizona, California, and New York. He and his family live in Jerome, Ariz., close to the mine.

Cripple Creek: An Inside Story—II

By N. E. Guyot

Prospector and Sometime Proprietor of the First Assay Office in Colorado's Famous Gold Field

W. J. STRATTON was gray when I first saw him in 1891. Like De La Vergne, Frisbee, Howbert, Lenox, Giddings and others, mining was a side line and speculation with him. A hungrier looking prospect than the Independence, with its dreary, weathered, rounded and sparse red granite outcrop, was never seen. It certainly never assayed at the surface and the shards of phonolite and the andesite which covered the slopes of Battle Mountain spoke only in whispers of the bonanza below.

Cripple Creek in January, 1892

A sizable town at the age of one year. Mount Pisgah is the pyramidal knoll on the skyline at the right

Hayden mapped the site of Cripple Creek as a "Trachorheite" formation and a possible *silver* area. To this day I have never found the word trachorheite in any geology. Stratton bonded his Washington lode, the south extension of the Independence, to a tenderfoot named Wilcox, of Colorado Springs, and, wonderful to relate, got $15,000 as cash payment. This gave Stratton money to work on the Independence, and the result was that in the dark days of the panic of 1893 Stratton was sending ranch wagons loaded with rotten, grayish, dirty-looking granite down to McKinney's stamp mill below where I had put my assay office at the forks of Squaw Gulch and the water-course called Cripple Creek. I shall never forget my amazement at seeing this ore going into a mill and being told that they were getting a thousand dollars a day out of the fifty tons daily going through. Some one had a crude concentrator in the creek below the mill and was making money, so he said.

I took a grab of this hungry looking ore. It ran $140 gold to the ton and soon thereafter it began to go to the smelters. Stratton had arrived. There was never a more generous man nor one less able physically to cope with the band of wolves and blackmailers of both sexes who assailed him on the slightest pretexts; and the jackals in the guise of rat-eyed attorneys followed him fairly into the grave.

Even his estate of fifteen millions dedicated by Stratton to found a home for prospectors has been diverted from this purpose. At one time a hundred lawyers, mostly of the tin-horn and hold-up type, harassed the property owners of Cripple Creek; and justice, as handed out in Colorado Springs, led to a situation where there were 5,000 adverse suits on the crowded dockets and juries of "lungers" certainly "handed it" to a non-resident of Colorado Springs. Ultimately this led to a division of El Paso County, the creation of Teller County, and a better deal for the original locator. Had Stratton lived, the history of Cripple Creek would have been different; for with the acquisition of scores of properties in the heart of the camp in which he reinvested several millions of dollars after he had sold the Independence for ten millions cash, and with his instinct for speedy development, it is likely that he would have accomplished as an individual results comparable to those in Butte. But Stratton died, the estate passed into the control of the lawyers, and leasers were driven out of the camp by impossible royalties and exactions.

The Portland was located on a fraction. John O'Hair's suit against Burns and Doyle for a grubstake interest became famous. He lost, but he should have won. Haman, the miner, got a third interest for telling Burns that the rock on his dump was ore. Then

came trainload shipments, a score of lawsuits, refusal by Moffat to buy the property for $75,000, a production equal to that of the entire camp of Goldfield, Nev., and dividends by the Portland in excess of all those of Goldfield.

Helpful Geology of Penrose and Cross

The coming in 1894 of Penrose and Cross to Cripple Creek, and their geological survey, is perhaps the best instance of real assistance given to miners early in the development of a new camp. They actually solved the problems, told us that the resonant and peculiar rock was phonolite, and taught us that the basalt dikes infallibly were near the orebodies, or that they made ore themselves, or were in contact with the ore. They marked the rim of the volcano and explained why the big orebodies in some cases were found at the rim. I have a dog-eared copy of Penrose's report and take pleasure in contrasting his accurate predictions of greatness for the camp compared with a later survey in 1900 wherein the conclusion was reached that below 1,000 ft. not much was possible in Cripple Creek.

This second report cautiously, but with determination, belittled the conclusions of Cross and Penrose. The people of Cripple Creek helped pay for this government work; they were hard hit by the report, but those who survive and know that the bonanza orebodies of the Portland, Cresson, and other mines go at least to a depth of 2,700 ft., reflect upon the fact that Penrose and Cross were two engineers, not auditors, and that not only did they know rock and ore, but they possessed the imagination which infallibly leads to and assists in the consummation of great things.

The death of Stratton, the tying up of great areas, the second geological survey, the strike of 1900, the forced exodus of thousands of miners and leasers, the discovery of Tonopah and Goldfield, led to the decadence of Cripple Creek. It is not yet half developed; later days and different owners will bring future activity, and fifty years from now the production will still be great in that camp.

In 1894 the miners' strike, which began in March and which was due to the fact that Moffat and Hagerman initiated a movement to cut wages to $2.75 per day, brought ruin to scores of the original locators in Cripple Creek. Many were compelled to sell out for a trifle; and what the career of many claim owners who were wiped out in this strike might have been but for it is food for thought. It was a picturesque time. When the 1,200 deputies marched in from Gillett—and doubtless a majority of them were of the essence of the rascality of the state—in the ranks were Dr. Penrose, Sherwood Aldrich, C. L. Tutt, and scores of others since notable in the mining world. Harry Shepard and I put in all night cutting up bunting for the representatives of law and order, who wore significant and inappropriate red rags on their left arms. I saw the Strong shafthouse go up in the air; like others I was advised to "git" and I got. When the "twelve hundred" rode back to Colorado Springs after the compromise, without firing a shot, we were a dissatisfied bunch. The stovepipe cannon on Bull Hill—indeed the whole controversy—is laughable today.

When Cleveland gave the final knockout to silver and the panic followed which shut down all the silver mines and practically poured salt on all the farms dependent upon the mining industry, thousands of the best miners of the West flocked to Cripple Creek, and as they all had some means of subsistence, they went to work and leasing became the order of the day. Doubtless, twenty times as much money was poured into Goldfield, Nev., as ever went into Cripple Creek. The leasers, early and late, made the great mines discovered after 1896. The Cresson had passed through many leasing groups.

The economic importance of the discovery of Cripple Creek, at a time when the gold reserves of the world had been depleted and Europe held the bulk of it, was not recognized; and when the exuberant prospectors early in 1892 sent a dispatch to Senator Teller saying the camp would produce gold enough to pay the national debt, it caused a laugh. The telegraphic line was built partly by the prospectors, as the Western Union de-

The first carload shipment from the Anaconda mine

This ore was shipped in February, 1892, and the smelter returns showed only $35 per ton in gold. The man with the derby hat at the extreme right is N. E. Guyot.

Dobson's hotel, the first in Cripple Creek, in 1891

"Old Man" Dobson, the proprietor, stands in the doorway. Jim Doyle is at his right. N. E. Guyot is the gentlemen beneath the left hand end of the "hay, grain and feed" sign.

clined to take a chance on the camp. The company thought it a shaky enterprise.

South Africa had not yet begun to show its greatness and the placers of the Pacific Slope were finished. Cripple Creek, with its production of $400,000,000 in gold taken from an area about four miles square, was probably the richest area of its size in the world. A hundred thousand men who penetrated every gulch in California from 1849 to 1860 produced a billion dollars in gold. The cattle range and the "Mount Pisgah fake" district thrived regardless of ridicule, suspicion, panics, and turmoil.

I first saw Sherwood Aldrich seated at a desk, writing, in the office of George Walker, mortgage broker of Colorado Springs. At that time Aldrich asked what I thought of a plan to build a stamp mill near Beaver Park, practically on the west slope of Pike's Peak. Of course I thought it a fine idea. In those days I didn't know a stamp mill from a coffee grinder.

Sherwood Aldrich: A Square Broker

I think that Aldrich is one of the few Colorado Springs brokers who was absolutely square, and I don't think that his successful career ever inspired envy or resentment in any one who knew him. There was a band of rat-eyed attorneys in Colorado Springs who combined to rob the original locators of Cripple Creek on technicalities, and they succeeded. The hundred legal wolves who preyed on the camp for ten years had gathered from all over the country.

Contingent suits were the order of the day. No one suffered more from them than Winfield Scott Stratton, who will always be remembered as the leading, typical figure of the Cripple Creek pioneers. In 1891 he was gray, disappointed in his private affairs, and was a miner by preference though not by occupation. From the first, before his property had been proven, he was looked upon as the coming big man of Cripple Creek. His lucky day had arrived. When Stratton died, prematurely, he left all his fortune to charity, and as it was about $15,000,000, at that time it was doubtless the most generous bequest ever made by any American. Of all the others who made their big stake in Cripple Creek I cannot recall one of the bunch of tradesmen, bankers, and manipulators who ever gave a copper to the needy. Stratton had his reward in giving. They will have theirs in leaving it all to their heirs, executors, and the lawyers. It is to reflect!

Telluride Ores Were Mineralogical Strangers

One time we were playing hearts with an illiterate but shrewd genius of the camp, "Stuttering Dick" Richmond. We combined to stick him, and usually did, but once he gave us a fine trimming, whereon I remarked, "Dick, we had you logically beat on that game." "Well, geologically speaking, I beat hell out of you both."

So, speaking geologically and mineralogically, when Cripple Creek was discovered few men knew anything of telluride ores, and by comparison what was termed sylvanite in Cripple Creek was as much of a mineral stranger to mining men as was the telluride, not then discovered but since named rickardite. Old John J. Crooke, who helped build the first section of the New York Central from New York to Poughkeepsie, and who was a pioneer miner and smelting man in the San Juan in Colorado, was probably as well informed as any one. But he told me in 1891 that gold tellurides were a freak; that they were treacherous, and wherever discovered had proved a disappointment. He said that Cripple Creek was no good. During all my high-grading in the cars and mills and on the "mixtures" at the old Pueblo smelter I had never run across any telluride ores, and if any ever came down from Boulder, or from La Plata or Lake City, I never heard of it. There was a specimen of the peculiar and complex tellurium ore from Custer County in the assay office; but it, with its dozen other metals in combination, bore no resemblance to the telluride ore of Cripple Creek, where the primitive roast in forge and fireplace and stone brought out pin points of gold mainly perceptible under a microscope.

There was no high-grade ore at the surface or near the surface. The 10-oz. gold ore that went from the Anaconda, the Pharmacist, and Gold King was an oxidized concentration, and there was very little of it No vein cropped to the surface; all were covered with alluvium to a depth of from 15 to 50 ft., as was the case on the Hull City placer, subsequently the Independence, where a score of miners were blown up and killed in the second strike in 1901. With some others I owned this tract, known as the Missouri placer in the beginning, but we let it slide as worthless.

Joe Findley, teamster of Canyon City, located the north end as the Findley lode claim, a fine producer. The first day I ever rode over the symmetrical, grassy, and sparsely timbered dome hills of Cripple Creek, I met Tim Hussey, Irish, eccentric, and the owner of an anomaly, the Prince Albert lode claim on Beacon Hill. Hussey had a dugout cabin on the south slope of what was first called Squaw Mountain, but which remained Raven Hill after the discovery of the rich Raven mine by De La Vergne. In 1891 Squaw Mountain, as it is now known, was called Granite Mountain, being chiefly red granite. On the southwest slope is the Alhambra lode, from which I took float that ran 70 oz. in gold; the oreshoot has never yet been found.

Hussey's cabin was the first habitation in what became the town of Elkton. He showed me a chunk of rock of a fine bluish tint which he informed me was "crystallized tellurium," and I can still hear the emphatic Irish roll of his r's as he said "crrrystallized tellurrrium." It was what was known afterward as fluorine, fluorite, fluorspar, and was almost invariably associated with the bonanza ore struck with depth all over the camp. This was doubtless high-graded to the extent of fully $20,000,000. This fluorspar likewise occurred plentifully where there was no payable ore. I had one claim, the Camilla, in which at 40 ft. we found boulders of fluorite quartz, beautiful to look at, which we took to surface by looping the windlass rope around them. The stuff ran about $2, and although I found a few hatfuls of iron sulphides which ran 80 oz. in gold and 80 oz. in silver, no mine was ever developed.

While I was in Manila in 1898 and 1899 fighting mosquitos and cursing the profiteers of that day, whom we called "belly robbers," some one sank a shaft in that Camilla, crosscut it "from hell to breakfast," and never got a pound of ore. This claim, named for a virgin queen of ancient birth, was well designated. It was virgin—not prolific of anything.

Twenty-seven Undivided Quarter-interests

Tim Hussey, like all the rest of us, gazed upon the flowing bowl frequently and persistently. It was his custom when on a celebration to go broke, and then, being *non compos*, so they thought, he would sell and deed an undivided one-quarter interest in and to and of the Prince Albert lode mining claim for any sum that he could get. So it went on, and of course some of the buyers put their deeds on record. But when the other purchasers of the twenty-seven undivided one-quarter interests in the Prince Albert compared notes there was a grand war cry from the bitten. But who could hold Hussey responsible? The Prince Albert was the theatre of famous lawsuits, and became a producer.

In 1894 there were more than 300 prominent properties in Cripple Creek and thousands of other locations. I patented about six acres of the Kentucky Belle, now a part of the Cresson group, and had to exclude twenty-three conflicting areas. One Colorado Springs legal genius represented the Rattler, which was patented across the middle of the Kentucky Belle and ran east and west. We were hung up more than two years before we got a patent. We had seven veins and dikes on the Kentucky Belle; we did a lot of work and were conceded to have the Moose vein, but found no oreshoot. The Cresson, which was then owned by a Chicago insurance man and consisted of the Alsa R., the Mary L. and other fractions, was destined to be shown as the owner of the bonanza shoots and chimneys of this locality. The Cresson company has paid in dividends more than $10,000,000 out of a production of $28,000,000.

Dick Roloff, who made his debut in Cripple Creek as the owner of the Green Bee grocery, on Second St., went broke as a merchant. But he was fated to take up mining and to succeed in making a big mine out of the Cresson after Frank Ish had busted himself and his backers in 1899 by sinking 500 ft. in what was known as the Marie shaft on Cresson ground at the head of Eclipse Gulch. Ish, who was a newspaper man from Kansas, established the *Cripple Creek Times*. I used to scribble his "mining column" for him once in a while. Ish landed in Goldfield, Nev., as a pioneer, and with the thousand or so Cripple Creek miners who made Goldfield, achieved considerable success there. He is still in the game somewhere. Like Wrigley, he owned a baseball club, but had no gum business to pay the losses.

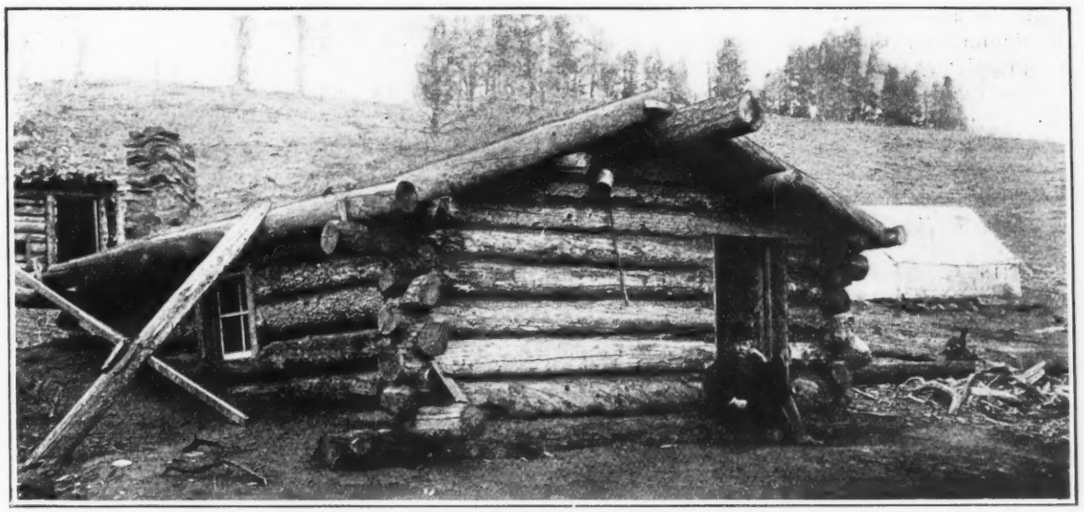
Dick Irwin Came and Saw and Went

Dick Irwin, the celebrated prospector, whose memory is perpetuated in the still existing town of Irwin, in Gunnison County, Colo., made my assay shop his headquarters during the fall of 1891. Every alternate day, after ranging the hills and sampling the shallow workings on prospects, especially on Battle Mountain, Irwin would run his own samples in our furnace. He was so suspicious of Cripple Creek that he even tested the fluxes, all of which had been sent to me from the Pueblo smelter when I engaged Jim Doyle as assayer.

Irwin's results were not satisfactory to him, and after buying a small interest in the Hidden Treasure lode from Lafe Fyffe, which claim was purchased subsequently by the Portland mine, Irwin departed for the Kootenay country. At that time I think he was about fifty-five years old—a courteous, silent man. But his skepticism could not be veiled. He paid a few hundred dollars for his interest in the Hidden Treasure, and no doubt made a handsome profit, but he was another of the old-timers who saw little that was impressive on Battle Mountain.

The Rosebud mill was built by Lavagnino and associates early in the game. It was situated at the forks of Squaw Gulch and Cripple Creek, and was a substantial if not pretentious plant when finished. I don't think that any of the early stamp mills did much good, as the ore then was usually of a smelting grade. The big tonnages of low-grade had not yet been discovered.

The Legal Tender mine, afterward the Golden Cycle, was from the beginning supposed by us tenderfeet, with our exalted and optimistic ideas, to be of too low a grade for utility. I would like to find today a good-sized open-cut, full of oxidized ore, in place, and running about $800 a ton, which the Legal Tender did near surface! After the usual tribulations the property, known later as the Golden Cycle, achieved great success and reputation under John T. Milliken, of St. Louis.



The first cabin in Cripple Creek—July, 1891

Pete Hettig was doctor, lawyer, merchant, pioneer, and hotel proprietor. His cabin was across the "street" from the National Hotel, a tent building at that time

During the panic of 1893, when cash was "practically not," the operators of the Pike's Peak property on Bull Hill, having a streak of very high-grade ore, used to take the sacks to the bank run by Dave Moffat and get pay-roll money. This property was about the only one in which the free gold, rusty to be sure, occurred in sufficient quantity to be tangible. Like the ten-ounce oxidized top ores of the Pharmacist, near by, the Pike's Peak was too rich to last long. Pharmacist Jones (peace to his bones!) ran a drug store in Colorado Springs. It was a prohibition town from the day it was platted; but, even as today, we got all the "hootch" we wanted in the drug stores. Jones went to Cripple Creek, and, accompanied by Paddy Burns, a celebrated character and one of the early settlers, after a half day's climbing selected a spot covered with bull pines. "This looks as good as anything else," he said, and so the Pharmacist was located. Burns located the Burns Lode, and his first partner was Jack Mullin; then I took an interest. The Burns is still a producing mine. My experiences with Burns and his liquid propensities were amusing. I retain the most lasting impression of Paddy Burns the night he was one of the audience watching a boxing match between a white man and a black boy in a hall over the Blue Bell saloon. The black boy was getting the best of the fight when Paddy jumped into the ring and interfered. In about thirty seconds both fighters had Paddy well licked. The case paralleled the traditional fate of the man who interferes 'twixt husband and wife.

Mrs. Buckhorn, as the lady was called (I never knew her real name) ran one of the early combination restaurant-saloon-gambling halls in the camp. It was a tent about 25 by 75 ft. in dimensions and roughly but effectively equipped, the roulette wheel and faro layout being very ornate, as usual. The place had the usual big sign, and a pair of antlers displayed in front explained why it was named the Buckhorn Saloon.

Early in 1892 it was announced that the first religious services to be held in camp would be conducted in the rear of the Buckhorn Saloon, this being the only place in town available. Accordingly, on Sunday morning the Buckhorn was closed down, a couple of big tarpaulins were hung across to conceal the gambling layout and bar, and the services — Catholic — were in progress. Paddy Burns, Jack Mullin, and I had a corner to ourselves, and the extempore chapel was packed. There is something awesome in the first celebration of religious services in a new camp. We all seemed to realize that in the middle of the wilderness here was a group of men engaged in founding a new community where homes, schools, churches, and industries were to rise out of the bleak and frozen solitudes. And so the mass was proceeding impressively when a disturbance arose.

Mrs. Buckhorn was a large and roseate and muscular specimen of frontier womanhood and had achieved a reputation for a command of energetic and incisive and appropriate-to-the-occasion profanity which was the envy of even Keno, the poetic mule skinner of the daily stage. It seems that some drunken driver had wandered in and desired a drink and a breakfast. The conversation was distinctly heard by all of us on the church side of the canvas. Mrs. Buckhorn in low and decent phrases explained to the stage driver that religious services were being conducted, that business was temporarily suspended, and would the customer please be seated and wait. Not so. "What the hell do I care for this Sunday school business?" said he. "I want a drink and some grub, and I want it damn quick." Mrs. Buckhorn was a lady of speedy tongue and action and her fiery temper was aroused by this sacrilegious speech. We heard the chug of some handy implement with which she clubbed him over the head and then the explosion, "I'll show you, you low down drunken son of a ——, that you can't come into my home and bust up the first Sunday school ever held in this camp! Get out of here, damn your soul!" and out she flung him. The services were concluded in peace.

In November, 1891, four men rode up to the assay shop. They were Canfield, an oil-well owner of Florence; McCandless, Collins, and Johnson, also citizens of the same town, which is about 30 miles south from Cripple Creek.

Jim Doyle, inveterate joker, had nailed up a rough sign inscribed "D. & R. G. Ticket Office," "Western Union Telegraph Office," outside of the rough log house in which we were living. These signs caused amuse-

ment, as the district was so thoroughly held in contempt and damned by the experts and the press of Pueblo and practically the whole State of Colorado that the assumption that a railroad or telegraph office would ever be established was considered preposterous.

Nevertheless, these four men from the little town of Florence were in the saddle for the exact purpose of reconnoitering the lay of the ground up Eight Mile Gulch as a possible right-of-way for a track.

"Chinese and Bohunks Barred"

Pueblo, the smelting city, the one town which should and could have had a direct railway to Cripple Creek, was dominated by two bankers whose souls were crystallized skepticism and ice. The townspeople were all skeptics. Using the bonuses given by the citizens of Florence, Moffat built the railway, and to the four men that I have named belongs the credit. They investigated the camp and returned to their homes and got busy. The railroad was finished in 1893, and the initiation of the work on this road spurred the really progressive element of Colorado Springs to construct the branch from Divide, on the Colorado Midland, to Cripple Creek, in 1894. Subsequently, a third road from Colorado Springs to the camp was built up Cheyenne Canyon.

When the prospectors organized the mining district of Cripple Creek early in 1892 the camp was physically remote from any city, although only 30 miles in a straight line from Pueblo and Colorado Springs. There was not a qualified surveyor in the district, all claims being surveyed by guess, a pocket compass, and a tape line. And the organizers of the camp were all tenderfeet. The regulation camp laws, copied partly from some old camp in Colorado, wound up tersely by saying "Chinese and Bohunks Barred." They never came in. One jackleg lawyer remarked after the camp laws were adopted, "Beyond the fact that these rules seem to repeal most of the ordinary laws of the United States they are a damn good set of laws for Cripple Creek."

An "Arbitration Committee" was appointed to decide disputes over claims, and the sanctity which has ever attached to the oldest location prevailed here also. But there were plenty of jumpers and many disputes. About the only case I ever heard of where the committee went on the ground was in the controversy between Jim Cody and "Old Man" Wanamaker, the latter being a rare-mineral expert for Tiffany's, who was perhaps one of the few experienced prospectors who were in the camp in the early days. The committee and Wanamaker proceeded up Squaw Gulch to the claim in dispute. Wanamaker was a very quiet and gentlemanly old boy, and carried a Winchester. When we got to the claim Cody was working on his location shaft and digging vigorously, being down about 8 ft. The committee surrounded the hole, "Old Man" Wanamaker being on one side. Without ceremony or discussion Wanamaker addressed himself to Cody. "What are you doing down there, James?" Jim replied, "Digging my location shaft." Wanamaker proceeded, "James, I want you to get out of that hole 'immedi-eightly,'" and he threw the Winchester down on Cody. "James" got out of the hole immediately. Wanamaker told him to "git," and he got, and was still "agitting" indefinitely, for Wanamaker held the ground. This terminated the "Arbitration Committee's" deliberations. There were many gun-plays over claims after that, regardless of the swarm of tinhorn lawyers who flocked to the camp.

In 1897 there were probably a hundred assay offices in the district, many of which were buyers of high-grade. Until the courts ceased to regard the rich ore as real estate, and that as such it could not be stolen, the high-graders did well and were a very thrifty and influential element in the camp. Then some one blew up six "assay offices" with dynamite one fine spring morning, the courts enjoined every one from buying anonymous ore, and the flourishing industry known as high-grading languished. Of course a couple of sampling mills which had connections with a certain well-known smelting company bought anything that came to them in dignified quantities; but big business was potential then as now. I don't doubt that fully $20,000,000 worth of high-grade was extracted and marketed from 1893 to 1903. It is hard to convince any miner working in a mine that it is wrong to accumulate "specimens."

I contributed to a certain collection in a dignified college in the East a chunk of ore for which I paid $45. Roasting it in a large scorifier about $28 worth of gold rolled off the specimen, and the ore was studded with pin points of gold as big as the small end of a collar button. Beautiful ore and oh! the happy days of the 90's!

The Virtues of Prospectors

Partners I have had included ranchers, miners, prospectors, merchants, gamblers; one Catholic priest, Father Volpe, a good, kind, and sincere soul he was; old Father Dyer, an itinerant and a famous Methodist preacher, who made many camps in Colorado, and many others. There were some good men in this group and quite a few scoundrels among us, after all. I will say this, that I have had a good many highway robbers for partners, but I never had a solitary partner in a mining camp who was not a man of broad and enthusiastic vision, poetic and exuberant imagination, and capable and aggressive propensities. Prospectors and miners are a peculiar group, and doubtless Columbus had in his bunch of "prospectors," who appropriated the New World, as choice a collection of rascals as ever blazed a track in the wilderness and opened the doors to civilization. The root of all good is money, after all.

Civilization, refinement, education, houses, churches, schools, and hospitals now dominate in nearly every mining camp which was first populated by many of the adventurous and unconscionable pioneers of all ages. Every railroad built in the United States west of the Mississippi owes its existence to the impulse given by the gold and silver mines of the great Far West. In only too many cases the men who made the trails and the mines and subdued the solitudes finished like Senator Tabor, broke. But he was a builder. In his beautiful opera house in Denver I saw inscribed on the drop curtain this legend below classic ruins:

> "So fleet the works of men,
> Back to the earth again
> Ancient and holy things
> Fade like a dream."

Tabor died broke. Moffat died broke. But the tremendous things they did for the communities in which they live still exert their forces; and, after all, it is better for any man to use all that he takes from the mine while he lives rather than have it fatten wolves of lawyers. Poor Stratton! In the day of resurrection I can see him using a pick handle on any lawyer in sight!

Marketing and the Mining Industries

A Survey of the Various Parties and Factors in This Branch of Mining

By George J. Young
Associate Editor

FARMERS and other producers of raw materials have benefited by a study of the way in which their products are marketed and also by a knowledge of the simple economics involved. Miners and mineral producers are in the same relative position as the farmers and similarly may also profitably inquire into the disposition of their products. In a short time the *Mining Journal-Press* will have completed its series of marketing articles dealing with metals and minerals and will publish these articles in book form. This is the first attempt to cover the subject thoroughly and to meet this obvious need of the miner. The accompanying article deals with elementary considerations in the marketing problem.

EMPLOYMENT is one of the fundamental elements in our civilization. In like manner a market is essential to industry. A chemical reaction is first slowed down and may be finally stopped where the products of the reaction are not removed either wholly or partly as the reaction proceeds. Industry is depressed when its production, whether metals, manufactured products, or otherwise, accumulates in the hands of primaries. It is also slowed down if the conversion products fail to find markets. Industry is sustained by the orderly progression of raw materials and finished products from producers to the chain which leads to the ultimate user or buyer. A buyer may use the commodity for a time and then pass it along to some other user. The ultimate end is the wearing out, or breakage beyond repair, of the object and its final disposal upon a waste heap or as junk. If it goes to the junk pile it may be separated into its component materials, and these in turn, after conversion of one kind or another, return to a market which is distinguished from primary markets by being called a secondary market. Secondary market implies used materials which after being put into marketable form are offered for sale again and will answer many of the purposes of virgin material. Selling and buying are complementary processes. There must be at least two parties to every transaction. However, the exigencies of business have resulted in the frequent interjection of a third party, who is known as an agent. The third party may perform the useful service of finding a buyer for the seller. His compensation consists of a commission which is paid by the seller. Sometimes the process is reversed and the agent may be engaged by a buyer to find and complete a transaction with a seller. Under certain circumstances, especially where there are continuous transactions of a similar nature, an agent may be compensated by a salary paid by his principal. This simple situation has developed into a more complex one in which the agent becomes an independent intermediary between buyer and seller. Under such circumstances the agent becomes a trader or speculator. He purchases outright from a seller and sells outright to the buyer at as great an advance over his buying price as he is able to command. He may purchase when prices are low and hold until prices rise. This is speculation. In the metal and mineral markets, principals, agents, traders and speculators play a part. In ore buying, smelting companies retain ore buyers on commission or salary, but it is probable that the greater number of transactions are by principals. In metal selling, agents play a leading part. In the handling of non-metallic minerals, both traders and speculators are not uncommon. In the buying and selling of petroleum, the transaction is usually between principals. Transaction may be on a spot, time, or contract basis. The spot transaction signifies a transaction completed by the prompt delivery of the goods, followed by prompt payment for them. The time transaction may involve delayed delivery and delayed payment, or delayed delivery and payment when or after delivery has been made. Delivery in all cases completes a transaction in so far as the seller is concerned. Payment may be made by the buyer, either promptly or as agreed between both. Quotations are prices which are given by a seller or his agent as the basis upon which both may consider a sale. They may or may not precisely rule in an actual transaction, which is sometimes conducted on a bargaining basis. The sales price is the price at which a transaction has been consummated. "Nominal quotation" is a quotation which is intended to represent a probable transaction where a market is dormant and sales are not being made. Sales made on the basis of contracts which are intended to bind two principals or their respective agents usually stipulate methods whereby prices can be determined for settlement. As an example, many ore sales are made under contracts of from one to five years' duration, the price basis being the quotations published by *Mining Journal-Press* at the time of delivery. Metal prices fluctuate in response to economic conditions. Except for gold, there is no fixed price. The pressure to sell may cause lower prices, and, on the other hand, the pressure to buy may increase prices. A large stock in the hands of primaries may make buyers hold off for lower prices; a scant stock may and usually does rapidly increase prices when buyers are active. The quantity involved in a given transaction influences prices to some extent. Large quantities sell at the lower prices in distinction to small quantities, which may sell at a decided advance over the larger quantities. Many smelting companies buy small lots of ore under the same terms as large lots, even though they lose money by so doing. This is done to encourage the small producer. Other companies attempt to charge more for small lots of ore

in an endeavor to compensate for the relatively greater expense involved in handling them.

In mining, marketing has certain peculiar characteristics. The products sold are ores, concentrates, nonmetallic minerals, clays, metals in final form, and metals and metal-bearing products which require further conversion or purifying before a marketable metal can be obtained. The buyers of ores and concentrates are only interested in these substances as raw matrials to supply their plants. They reduce them and then pass on the metals obtained to others who may be manufacturers. They do not keep the metals and are not interested in their final disposition.

All goods, all metals, all ores and concentrates, as they stand, represent a certain money input for labor, power, supplies, insurance, capital charges, and taxes. This money input is dead capital until the goods are sold. A business transaction therefore vitalizes this capital and enables the recipient of the sales price to go on producing more goods, metals, ores or otherwise, and by indefinitely repeating the process to remain in business. Inability of the market to absorb the goods results in the introduction of a time element. The holder of the goods may store them to await a time when the market returns or he may seek to vitalize some of his capital by offering the goods for sale at a price equal to what his capital input was, or even less than this figure.

Supply vs. Demand

In the case of ordinary commodities, markets continue on indefinitely but vary in their degree of absorptiveness. At times demand exceeds supply and other times supply exceeds demand. In the former situation prices rise and in the latter circumstance they fall. Where the goods are in strong hands the extent to which prices will fall depends upon the policy adopted by the sellers. They may establish a minimum price, and, if buyers fail to appear at this price, the market becomes dormant for a time. If goods are in weak hands they are usually sold at sacrifice prices when the market becomes dormant. Speculation thrives on rapidly rising prices as well as rapidly falling prices. Shrewd buyers shop around during a dormant market seeking to find the sellers who must sacrifice their holdings to get cash.

The wholesaler will buy and store a certain volume of goods which is necessary to enable him to supply his customers without delay. To purchase more goods than this amount would needlessly increase his cost of doing business, his overhead, by tying up more and more capital. Under favorable price conditions he may increase his floating stock by taking advantage of the low prices. In doing this he becomes a speculator, for he is counting upon a rise in prices to pay not only his normal profit but also the expense for carrying the additional quantity and an allowance for additional profit besides.

The fundamental point to consider in the case of the wholesaler is that he has no pride of ownership in the goods but is only interested in selling them at advance over what he has paid, and as quickly as possible. This is precisely the position of the smelting company that buys ores. The smelter reduces the ores as quickly as possible and sells the metal as soon as possible. If he buys the ores outright, he takes chances that the metal market may offer lower prices at the time of sale. He may sell the metals and pocket his loss, or he may keep the metals for a more favorable price offering. To do this he must be able to command sufficient capital, as he must pay for his labor, power and various bills as they fall due, to carry his stored metals over the unfavorable market. The business of the smelter or ore buyer, as thus conducted, becomes a series of buying transactions complemented by a series of selling transactions. In each buying transaction the smelter seeks to protect himself as far as possible from falling markets. His selling operations are predicated upon the conditions in the metal markets. The rate or volume of ore buying depends upon the working capital of the smelting company, the storage, and the smelting capacity of its plant.

Settlements of the Smelting Companies

Another form of doing business is for the smelting company to conduct its business as if it were an agent for the ore seller. The ore seller sends his ore, and may receive a partial settlement amounting to from 50 to 75 per cent of the price involved at the time of receipt. When the metals are marketed the transaction is closed and the balance paid to the seller. This practice is equitable, but where small quantities of ore are handled it becomes difficult to determine when the small quantity of metal has been disposed of. To obviate this difficulty final settlement may be made at a price which rules on a certain day from one to three months after the ore was received. Deferred settlements enable a smelting business to be conducted without the speculative element, or by its substantial reduction. The smelter may buy ores from day to day which will represent the metal-selling transactions in quantity, or he may sell only as much metal as is received in the ores bought on each day. Thus the buying of the ore and the selling of the metal are almost simultaneous. It is evident that this to a considerable extent will reduce the element of uncertainty in the smelter's business.

Ore buying is done in many instances on a contract basis, the seller contracting to supply a given tonnage per month, or per year, of ore of certain characteristics, but not necessarily limited by too narrow a metal content. The purpose of this is to insure a flow of material of either basic or acid character, or of high lead content, to the smelting plant. The smelting plant is under the necessity of maintaining slag-forming constituents in certain proportions, as well as a certain lead content where lead blast furnaces are operated. To insure steady operation, the ore buyer endeavors to contract for the ore constituents essential for continuous operation. In each smelter a greater or less quantity of miscellaneous ores can be handled under such circumstances.

The mine operator who does not contract his ore may have to send it far afield to get it reduced, as the ore stocks at his nearest custom smelter may be loaded up with the same type of ore and the smelter may therefore be unable to buy. Ore contracts are on the whole excellent, as they tend to stabilize the business of both smelting and mining. On the other hand, hand-to-mouth sales result in irregular operation, although at times competition for such ores provides an opportunity for more advantageous selling. As in other business, affiliations and friendships play their part in the disposal of ore. A producer who plays fair and is well liked

may have little trouble in selling his ore even though there is little advantage to the buyer in handling it.

Not such a definite market exists for non-metallic minerals. Two reasons are the cause of this condition. The first is the lack of standardized quality. Producers neglect to set standards and fail to give their material preliminary washing, or cleaning; nor do they endeavor to produce a uniform product. The product is mined as it comes, and, with little preparation, may be put upon the market to bring what price it may. The buyer must clean and prepare the material until he has a product which he can use. Frequently he will have to buy equipment for this purpose. As a result he has the advantage in buying. This advantage would accrue to the producer if he were able to sell a uniform product satisfying commercial requirements. The second reason is that transactions are scattered over a wide territory and there is little tendency to centralize the business. It springs up where it is needed, and the raw materials flow to the manufacturers. Another difficulty is the absence of price stabilization. This is due to the lack of commercial standards and the geography of the business. *Mining Journal-Press* has pioneered in the work of establishing a market for non-metallic minerals by securing the best information obtainable on prices and publishing it from week to week. In time this will have the effect of creating a considerable degree of stability in prices and eventually a horizon line for transactions in these minerals. Thus the non-metallic mineral market may be said to be in process of formation.

Petroleum occupies a unique position. Prices are established by large buying organizations which are in the business of refining and marketing refinery products. Some of these organizations are also petroleum producers. Prices are stabilized over certain petroleum-producing areas and over definite intervals of time. They slowly reflect the relation between supply and demand.

Interrelation of Foreign and Domestic Markets

The balance wheel of the metal-producing industry of the United States is domestic industry. The fact that the metals are disposed of on a world-marketing basis is not without embarrassing features as well as advantages. Too large a production sends a surplus to foreign markets. In the marketing of copper, exportations have been in the past a considerable proportion of the producing capacity. It is not enough to produce metals and sell them at or about the cost of production. There is no profit in this, and all the advantage accrues to the other fellow. Nevertheless, unrestrained production, prefaced by unrestrained promotion and development of mines, results, or has resulted, in the case of both copper and zinc, in overproduction of metals and a situation all to the advantage of buyers. The result has been to cause the high-cost copper and zinc producers to shut down or mark time in their operations during low price intervals and to reduce the profits of the low-cost producers. In some circumstances it is cheaper to operate a mine, even though no profit is made, than to shut it down. However, there is no adequate control over such a situation.

International movements of metals relieve the situation to some extent. In this the world market is of advantage to our mineral producers. It works both ways, however. In times of increased domestic demand, price conditions may attract foreign metal, thus acting to the advantage of the buyer, reducing the profit that would naturally accrue to the domestic producer.

The petroleum market presents interesting market situations. The flush production from Mexico undoubtedly leveled prices of domestic production. The world market for petroleum products has been of great advantage to the refiners, and, therefore, of some indirect advantage to the domestic producers. The greatest factor in the price of crude petroleum has been the flush production in the domestic petroleum districts. This has had its effect in leveling downward the price of crude and diminishing the profits of all of the producers. It has created situations favorable to the buyers. Unrestrained exploitation is at the bottom of this difficulty, and no machinery exists to control the situation. As a consequence there is a waste of capital as well as a waste of natural resources. It is an interesting situation. An adequate remedy for it would be an important topic of discussion.

The New Producer

The new producer who enters the metal market has no special difficulties except in the instance of such metals as aluminum, nickel, and metals which are narrowly used. In these instances he confronts a market which is more or less controlled by individuals, or companies, who have developed the ultimate markets for these substances and who are under no special obligation to take the new producers' product. Under the circumstances the new producer must seek to contract his supply with the parties already established, or else must organize and develop a sales force to compete with them; or he must pioneer for new uses and new markets.

In petroleum, the new producer usually has no special difficulty in disposing of his product to intermediates, as the petroleum market is a broad one. He may find it to his advantage to contract his product to some strong company. This protects his business during periods when the minimum of petroleum is being marketed. In such times, unless the petroleum producer has a crude which has very desirable properties, he is compelled to close in his well and await a better market.

The situation in non-metallic minerals is more acute than in the case of metals. The prevailing practice is against the open market and in favor of the long-time contract. The new producer, unless he has a product which is in exceptional demand and is of excellent quality, is at the mercy of the buyer. He has three possibilities: He may seek to contract his supply under the most favorable price conditions; he may go into the manufacturing and selling of his product (this means the splitting of a market already in strong hands); he may pioneer new uses and create a new market for the substances manufactured from the non-metallic.

Combinations of Buyers

Combinations of metal buyers have been made. The ramifications of the Metallgesellschaft, or the German metal-buying combination, before the war are well known, and undoubtedly to a greater or less extent the practice of an agent buying for a number of clients has been in vogue for a long time. Naturally, such an agent would seek to purchase at as low a price as

possible. He might even sell a particular metal in quantity with the object of depressing prices and confusing the market situation. In doing this he becomes a trader. The great difficulty involved in this situation is when buying power becomes concentrated to such an extent that the quantities become so great as to influence the market profoundly. Thus the withholding of this buying power for a sufficient time would exercise a marked depression upon the prevailing metal market. The law of supply and demand applies to the situation, but at best this law works out slowly, and astute manipulators can consequently derive advantage where they control buying power. If combinations of producers are illegal, then combinations of buyers should also be illegal. It may be argued that combined buying power should derive an advantage in price on account of the large volume involved in a transaction. Undoubtedly, a price concession under the circumstances would be fair, but only on the assumption that market manipulation is non-existent. This condition is impossible to reach. More or less market manipulation goes on at all times. An extreme difficulty arises in the international phase. Foreign buying power may be so concentrated, as in the case of copper, for example, as to give the incentive to manipulation on a huge scale. The result would be to mulct the domestic producers of a part of their fair price. Apparently there is no practical way by which to control this international situation. The answer to this situation is the building up of manufacturing and the further development of foreign trade.

Metal Stocks and Manufacturers

Metals occupy a primary position with respect to a chain, of which the first link is the mine, and, in sequence, the smelter and refiner, the metal-selling agent or agency, the manufacturer of commercial metals into primary forms such as sheets, bars, rods, and plates, the manufacturer of hardware, bolts, screws, miscellaneous small parts of great variety, and the manufacturer of machines and miscellaneous metal goods which are either sold directly to consumers or to wholesalers, who in turn sell to retailers and these in turn to users or consumers.

A market at the end of the chain which is resilient and which has been stimulated by good salesmanship up to the point of absorbing a generous flow of manufactured products causes a corresponding activity in the primary metal market. Necessarily, there is an accumulation of virgin metal, partially manufactured metal, or metal in process of manufacture, and finished goods awaiting sale all along the line. These stocks are a necessary commercial expedient to prevent delay in consummating a transaction, whether it be an intermediate or a final one. In consequence of this tendency to stock up, the primary metal market is not a continuous even flow of metal, but a more or less irregular jerky affair, exemplified by periodic sales of greater or less magnitude. A large manufacturer may replenish his metal stock when he thinks that a rise in price is imminent, or when he considers that the bottom has been struck in declining prices. He may pursue the policy of buying from hand to mouth. Necessarily, a variety of business policies and exigencies will influence the volume of metal sales from week to week. Periods of slackness occur when large buyers are off the market and periods of rapid and large transactions when they are in the market. To a certain extent a similar situation exists in the sale of manufactured products. There is, however, a tendency toward seasonal buying, or buying during well marked periods in the transactions affecting manufactured products, and even in the buying of virgin metals.

A slackening in demand in the ultimate market slows up in a short time transactions of an intermediate kind, from producer to consumer. Because of the practice of buying on time (thirty to ninety days' payment), the money flow back from the ultimate sales continues, as well as does the movement of manufactured goods, for an appreciable time before slackening. The end man, or retailer, finds that his stock accumulates. Each intermediate also finds an accumulation; or, in other words, his capital does not turn over as fast. The resultant of this is to stop buying all along the line. The sale of raw materials stops. The stocks in the hands of all concerned are drawn upon to continue such business as is offered, but no interest is taken in the primary metal markets or in raw materials. This market becomes temporarily dead, except for the activities of such individuals who may be searching for bargains.

Manufacturers must have raw materials. During periods of accumulating primary metals, or other raw materials, the buyer has the advantage in price. Hence the term "buyer's market." During the period of great ultimate market activity conditions are reversed, and the raw-material market control passes into the hands of the seller—the market becomes a "seller's market."

It would appear to be a corollary that the producer of raw materials could adjust his production to accord with the probable demand, and as a consequence buyers would be confronted with the constant condition of a lean supply whatever the demand. The result of this concerted action would be a stabilization of prices and the avoidance of the necessity of sacrificing raw materials already produced or in process. Conditions are such that this cannot be done except under those rare circumstances where some commodities are so scarce that an important company may control the source to a large extent, or may control the ultimate market.

In all of the common metals there are a number of primary producers whose financial condition varies between wide limits. At one extreme is the producer, who must sell what he has to meet his immediate bills; at the other is the well-financed company, which need sell only when it is to its advantage to do so. All along the chain a similar condition prevails, ending in the retailer, who must mark his goods down to get rid of them and raise the money with which to pay his rent and clerks.

One of the most interesting things to the primary metal producer is the attitude of mind of the intermediates toward the metal in question. Usually the motive compelling the manufacturer to use a certain metal is either necessity or custom, or both. Primarily metals are used for specific purposes because of certain physical and chemical properties which favor the specific use more than any other metal would. The manufacturer proud of his reputation will not resort to substitutes. On the other hand, the manufacturer who has no advantage over the established concern in quality of goods will seek to attack the sensitive price element. He may not be able to produce a standard article from standard materials below the cost of the established producer. He endeavors to find a cheaper substitute

for the materials customarily used. Thus iron gilded with brass is substituted for brass. By the saving in material a lower price can be made. This lower price is frequently not commensurate with the differential between the cost of solid brass and the coated article, but is just sufficiently lower in price to attract the purchaser away from the higher-priced article. Thus quality is degraded and the better article is to some extent forced off the market.

This process of substitution and progressive cheapening has gone on unrestricted, with the result that metals of inherent quality are only sparingly used in some instances. Government control over manufacturing has never been worked out, and no hope to remedy this situation can be expected through legislation. Apparently the only way is the fundamental method of educating the public by publicity. The manufacturer is inert when it comes to the point of educating the public in this manner. The hardware dealer is merely interested in selling. Logically and practically it devolves upon the producer and the marketer of primary metals and primary manufactured forms of metals to conduct this campaign of education for their respective metals. It is to their interest to see what happens in the hands of the manufacturer and to fight the policy of substitution. It is up to them to see that the buyer of building hardware appreciates the value of good brass. Just as a raisin grower advertises to the general public the lusciousness of a raisin pie, so those interested in widening the market for copper and zinc must inform possible users of the durability, beauty, and appropriateness of brass in interior decoration and for certain building purposes.

New Points of View

A definite change has taken place in the attitude of mining companies since the war. Before this war period mining companies sold their metals either directly to buyers or else to custom and smelting companies, who disposed of the resultant metal upon a market which seemed to possess the ability to absorb practically all that was offered. This observation applies only in a general manner. In the case of some metals prices fluctuated between wide points, proving that the market did have limits to its capacity to absorb metals. This is true of almost all of the metals at different times. The reason for the absorptiveness of the metal market has been probably due to the fact that the metals of the United States were disposed of partly to domestic consumers and partly to foreign buyers. The result has been to establish a world market for metals and the price has been the resultant of world conditions. The war disrupted the steady flow of the metals into foreign countries and for the time threw the metal sellers wholly upon the domestic market. As a result of the inability of this market to absorb more than a part of the normal production, keen interest has been taken in the methods or uses to which metals have been put, and definite campaigns have been started to increase the uses of various metals, to the end that the demand would be stimulated. Before this period no miner had any interest in what happened to his metal after it had been paid for. As a consequence the metals had to go their way unsponsored. No one was interested enough in them to shout their praises. It was left to the caprice of the manufacturer to select such as he chose and to pass them on to his customers, who accepted what he gave them without protest. Thus each metal was used where it could not be avoided. For other uses cheaper substitutes were in order, and neither consumer nor primary producer was especially interested in seeing that the metal got a square deal.

In the case of nickel and aluminum, however, a different situation prevailed. Both of these metals are produced under close control, and their uses were more or less limited. To increase the demand and to create a sales market the producers had to embark upon the manufacture of these metals into different articles and organize a sales force to dispose of them. The public had to be educated to appreciate their value. Aluminum pots and pans have established themselves in almost every household. Tin pans have lost their former supremacy, and the business of the kitchen is now done by the aluminum route. Intensified sales pressure has created a market for aluminum and nickel out of proportion to the market which would have prevailed if these metals had been allowed to take their place without the salesman sponsor. Only the engineer would have appreciated their valuable properties, but he would have used them in highly specialized cases and in relatively limited amounts. The aluminum and nickel campaigns are now paralleled to some extent by copper and zinc campaigns. First the zinc producers organized and investigated the uses of zinc and started a publicity campaign to give a good name to their metal and next to get the man upon the street to think in terms of zinc. The copper producers followed, in a similar campaign.

The primary metal producer should be just as much interested in what happens to his metal in transit from his hands to the consumer as is the raisin or orange grower in his product. Raisin growers and orange growers spend money to advertise their products and to educate the public in the use of them. The market is thus energized. Demand is increased over the demand which arises from normal causes. Sales resistance is partly individual inertia. Advertising overcomes the inertia of many individuals and thus decreases sales resistance. It is instructive to the man who does not know; it is a reminder to the man who has forgotten. Raisin growers band together to distribute equitably the burden of this campaign of education. Metal producers can do the same and are now doing it to some extent.

Marketing Articles

The series of marketing articles which have been published in *Mining Journal-Press* during the past two years was deliberately planned to bring all possible information upon the details of marketing metals and mineral substances before our readers. It was hoped that these articles would in some instances help to create standards, or at least to indicate where standards are needed. The practice in buying, the weights, the geography of markets, the quantities handled in buying and selling transactions, the terms of settlement, and other details have been brought out in specific instances.

Marketing is of fundamental importance in the mining industries. It has not had its fair share of attention, nor are our mining men schooled in the subtleties of buying and selling. However skilled they may be in developing and exploiting mines, their efforts will not bring the fullest possible return unless they show as great astuteness in the business of selling as they show in the business of operating their mining properties. The prosperity of the mining industries depends to a great extent upon skilful advertising.

A Brief Review of Iron Mining in Mexico

Industry Started With Subsidy First Proposed by Humboldt

By Kirby Thomas and John Eoghan Kelly
Mining Engineers, New York City

THERE IS NO RECORD of the use of iron by the Aztecs or Mayas, whose empires flourished before the Spanish conquest of Mexico. The Indian miners worked gold, silver, tin, copper, quicksilver, and perhaps lead ores, but the iron resources were ignored until the close of the eighteenth century. Even today, the production of iron in Mexico lags behind that of precious metals, and Mexico has always imported iron and steel in all forms, from pig to machinery.

The famous Baron von Humboldt, who visited Mexico in 1802-04, noted that the Peninsular War, which cut off supplies of iron from Europe, had caused the working of iron ores at Tecalitlan, near Colima. The awakening was short-lived, as the Peace of Amiens reopened the sea routes, and the Mexican purchasers preferred Spanish iron. The war had caused an enormous increase in price, iron having risen from $34 to over $500 (United States currency) per ton, and steel from $174 to $2,000 per ton, laid down in Mexican ports. The imports of iron and steel during Humboldt's visit were as follows, the values being in United States currency:

Year	Iron	Steel
1802	$251,939	$129,449
1803	385,718	92,165
1804	406,353	52,265

Humboldt lamented the preference of the miners for gold or silver prospecting and recommended a state subsidy to encourage the production of iron. He considered iron of much greater value to a nation than gold, which he regarded merely a symbol representing real values.

Thanks perhaps to Humboldt's suggestion, a subsidized furnace was established at Coalmocan in 1804 and was operated successfully. Destroyed during the wars of independence (1810-21), the furnace was rebuilt in 1840 and operated for a dozen years until again burned.

Several Producers by 1852

In 1852, iron was produced at the following places: San Rafael, Morelos, about 500 kg. being produced daily; the ore worked contained 55 to 60 per cent iron. At Guadalupe and La Encarnacion, Hidalgo, where iron was produced at a cost of $20 per ton. At San Francisco, Durango, from the famous Cerro del Mercado, now owned in part by the Monterey Iron & Steel Co. At Tula and Xapotan, in Jalisco; Oaxaca; Zacualpan, in the State of Mexico; Zacualtipan, Hidalgo; and Atotonilco el Grande, in Hidalgo, completed the list. At this time pig iron was worth from $200 to $300 a ton, and cast iron from $600 to $1,000, according to a record published in the Memoria de la Secretaria de Fomento, Mexico City, in 1857. Steel was not worked. In 1865, work was started at Apulco, Hidalgo, from four to five tons being produced weekly. In the same year, the furnace at Zacualtipan was the greatest producer in the country, shipping up to eleven tons daily, but shortage of charcoal caused a suspension of operations, although the company possessed cutting rights on 90,000 acres of timber land. In 1868, production was at the rate of 5,000 tons annually. Within the next ten years about twenty furnaces were active, with one exception of small size and supplying only the demands of the immediate locality. Only iron from the furnaces at La Encarnacion was used throughout the republic.

Charcoal was universally used in treatment, each company requiring extensive timber lands to provide fuel. In 1877, a company owning a furnace at Tula, Jalisco, purchased 66,000 acres. The owners of La Encarnacion built 18 miles of narrow-gage railway, with cuts and bridges, to haul fuel. As the charcoal supply retreated ever further from the furnaces, and the cost of living increased, the more isolated works were gradually forced out of competition by imported iron and steel. The foreign products have constantly forged ahead, until today the only old-time furnace still producing is that of Apulco.

Iron Industry Once Profitable

Before Mexico possessed railways that permitted the entry of the better made and more convenient foreign shapes, the iron industry of Mexico was very profitable. La Encarnacion sent the major part of its products to Mexico City, building and maintaining 175 miles of road through very difficult country. All this overhead was supported by the furnaces.

In 1900, with the formation of the Monterey Iron & Steel Co., Mexican iron production entered into a new phase. This company owns iron deposits in the Cerro del Mercado or "Iron Mountain" district in Durango, as stated before; the Cinco de Mayo iron mines in Coahuila, and a blast furnace at Monterey. The blast furnace employs upward of 2,000 men, contains a 300-ton furnace, a bolt and nut factory, a wire mill and wrought iron works, and is modern in every respect. The average annual production over a period of eighteen years has been 32,000 tons.

The Cerro del Mercado, or Iron Mountain, is about 1½ miles long, one-third mile wide and from 200 to 400 ft. high. It has been extensively explored, and its ore reserves are conservatively estimated at 360,000,000 tons. The ore is specular hematite and magnetite, averaging 60 per cent metallic iron.

There are only two iron producers in Mexico today. Other causes than the formation of the Monterey Iron & Steel Co. have accounted for the closing of other furnaces. This is shown by the fact that during the decade 1903-1913, when the Monterey production was at its peak, the average annual importation reached 203,000 tons.

The following figures show to what extent imported iron and steel dominate the Mexican market. The period covered is that just previous to the revolutionary era, when Mexico was at the height of its prosperity. Figures are in metric tons.

Year	Imports	Monterey	Other Mexican
1903	144,870	21,583	13,411
1905	197,177	4,388	1,611
1907	246,015	16,238	3,456
1911	172,373	71,337	No data

The reasons for the closing of the small furnaces are to be found in (1) foreign competition of high quality

and standardization; (2) difficulty of securing fuel; (3) lack of funds on the part of the native owners to equip their mines with modern furnaces. With foreign ownership and management and the development of hydro-electric power, Mexico might rank well up among the iron producers of the world, for its iron-ore reserves are enormous.

Some of the principal deposits have been examined by Mexican and foreign engineers. Maximum and minimum estimates in metric tons are given below:

Deposit	State of	Maximum	Minimum
Mamey	Colima	50,000,000	6,000,000
Apulco	Hidalgo	200,000,000	200,000,000
Cerro del Mercado	Durango	360,000,000	200,000,000
La Piedra Imán	Jalisco	2,500,000	2,500,00
Carrizal	Nuevo Leon	9,600,000	9,600,000
Las Truchas	Michoacan	(*a*) 1,069,081,075	(*b*) 9,000,000

(*a*) This estimate is that of Anderson, who supports his figures by dimensions and a map, and states that he does not include possible ore lying below the zone of his calculation.
(*b*) Estimate of Ezquiel Ordoñez. He does not state that he has visited the deposit.

Average assays of a number of these deposits have been reported as follows (*c*):

Deposit	State of	Percentage of Silica	Phosphorus	Manganese	Iron
Cerro del Mercado	Durango	0.288	.....	....	62.8
Las Truchas	Michoacan	0.09	0.06	0.02	68.0
La Piedra Imán	Jalisco	0.02	0.018	....	60.2
Carrizal	Nuevo Leon	0.212	0.006	0.07	65.8

(*c*) The above data are from "El Fierro en Mexico," published by the Secretaria de Industria, Comercio y Trabajo, Departamento de Minas, Mexico, 1921.

The Mexican Government last year appointed a commission to study the iron and steel situation with a view to determining a means of developing Mexican iron-ore reserves and ending Mexico's dependence upon imported iron and steel. A preliminary report made recommended: (1) a duty on all iron and steel shapes, and, later, on machinery when the Mexican industry shall have been sufficiently developed; (2) preferential railway rates for domestic producers; and (3) all state purchases to be made from domestic producers wherever feasible. The report recognized the need of foreign capital and management in the development of the Mexican iron and steel industry, and such foreign-owned mines and furnaces are to enjoy the proposed preferential treatment.

Interesting Placer Ground Near Wheatland, Wyoming

NEAR Wheatland, Wyo., is a tract of interesting gold placer ground. It includes about 18,000 acres of claims along the Laramie River, which are not patented, belonging to Homer T. Darlington, of Casper, Wyo., and his associates. Although the sands lie along the river, they are in the main not river sands but old Neocene sands and volcanic ash, 98 per cent of which can be washed through a 60-mesh screen, though barren of slimes or clay. Wells dug indicate that fine gold in paying quantity probably occurs throughout the greater part of the area to a depth of several hundred feet. The gold is in the sand and not on bedrock.

Prospecting has been carried on by shafts to a depth of 75 ft. in the sand, and by tunnels in stream cliffs. Small recovery plants have been installed. One 16 miles southwest of Wheatland is intended to handle several tons per hour by amalgamation, using plates, Pierce amalgamators, and Keene hydrostatic amalgamators. The latter gave the best results, but the recovery was not good, because of the fineness of the gold.

A second plant was installed at Uva station, 6 miles north of Wheatland, on the C. B. & Q. R.R., on the Laramie River. Here tests were made as to the possibility of roasting the sands and then cyaniding. Recovery costs were too great to permit profitable operation.

Tests by the Western Research Laboratories of Denver showed good recoveries of the gold, using tar as a flotation agent. Direct flotation with tar probably would require grinding with tar, which might be cheaply done on a large scale.

Another novel flotation method was tried. The sands were agitated in a small tank with a cone-shaped bottom containing mercury through which the agitation air passed, the object being to flour the mercury. The mercury was kept bright by making it the cathode for a small current. After a half-hour agitation the liquid mercury was drawn off, and a hard-wood oil added and the floured mercury recovered as flotation foam. The gold was usually about equally divided between the recovered flour mercury and the pool mercury in the bottom of the agitation tanks. Recoveries were over 80 per cent.

In the Andes of Peru—Above Lake Pun Run

A dolomite mountain in the Cordillera, five miles south of Mina Ragra

Conflicts Between Agricultural Entrymen and Mining Claimants*

How Disputes Are Settled by the General Land Office

By J. H. Favorite
Chief of Field Division, General Land Office, San Francisco

THE ACT OF CONGRESS approved Dec. 29, 1916, commonly known as the "Stock-raising Homestead Act," has caused some trouble in areas where prospecting and mining are being carried on, because of the fact that this law permits the filing of homestead entries on land that is known to be mineral-bearing, reserving the mineral in the land to the United States. Most of the trouble growing out of the passage of this act is due to the fact that the provisions of the law are not generally understood.

Whereas this law does permit the filing of a homestead on lands in a mineralized area, it was never intended to give the right to a homestead entryman to file on lands that are located, claimed, or occupied for mining purposes, and it does not give any such right.

Classification of Lands by Geological Survey

Under the stock-raising homestead law, the duty of clarifying the lands to be entered under the act devolved upon the U. S. Geological Survey. As the law specifically provides for the making of entries on mineral lands, reserving the mineral to the United States, the question of whether the land was mineral or nonmineral in character did not enter into the making of the classifications. Furthermore, as it was impossible for the Survey to make a careful examination of each legal subdivision involved, many designations were undoubtedly made covering tracts that were in the possession of mining claimants. This was the origin of most of the trouble, with the additional fact that when the regulations were first issued under this act the homestead applicant was not required to show in his application that the land was not occupied or claimed for mining purposes.

As soon as it was called to the attention of the General Land Office that the failure to make the homestead applicants give the information mentioned in the foregoing in their applications was permitting applications to be filed on lands covered by valid mining claims, the regulations were amended requiring that in each stock-raising homestead application the applicant should swear to the following statement:

"That no part of said land is claimed, occupied, or being worked under the mining laws; that said land is unoccupied and unappropriated by any person claiming the same under the public land laws other than myself."

As soon as applicants under this act were required to include the foregoing statement in their sworn applications, it became impossible for them to file applications on lands covered by existing mining claims without committing perjury. Even under the old homestead law it was possible, if an applicant were willing to commit perjury, for him to file on land occupied and claimed for mining purposes; so that after this declaration was required to be made in all stock-raising homestead applications, the situation under the stock-raising homestead act became the same as it was under the old homestead law, except that *discoveries of mineral or mining locations made subsequent to the allowance of the entry* do not give the mining man the same rights that he had prior to the passage of this bill.

Prospectors' and Homesteaders' Rights

In other words, under the old homestead law, if a prospector went on a tract of land embraced in a homestead on which final proof had not yet been made, and found thereon a deposit of mineral sufficient to support a mining location, he could proceed to locate the land and contest the homestead entryman; and if he could establish that he had a good mining claim he could compel the segregation of the land claimed from the homestead entry and secure a patent to it for himself.

Since the passage of the stock-raising act, the miner's rights are restricted in the following way: Should a prospector discover a deposit of mineral on a stock-raising homestead entry after the allowance of the same, he can proceed to make a location just as under the old law and can go ahead and work the claim, but he cannot cause the land claimed to be segregated from the homestead and secure unlimited patent to the land as he could under the old law. His rights are defined in the regulations issued under the act, briefly as follows:

"He may secure the right to hold possession of the land claimed, and to mine and remove the minerals therein, and to occupy so much of the surface of the land as may be required for all purposes reasonably incident to the mining or removal of the minerals by either one of the three following methods:

"1. Upon securing the written consent or waiver of the homestead entryman or patentee.

"2. Upon payment of the damages to crops or other tangible improvements to the owner of the land under agreement.

"3. Upon the execution of a bond or undertaking to the United States for the use and benefit of the entryman or owner of the land to secure payment of such damages to crops or other tangible improvements of the entryman or owner as may be determined and fixed in an action brought upon the bond or undertaking in a court of competent jurisdiction against the persons and sureties therein."

Should a stock-raising homestead application be filed for land covered by a mining claim or on which a miner is working, and should such an application be allowed before the miner has an opportunity to object to the allowance of the same, the miner can contest the homestead and secure the cancellation of that part of it that is in conflict with his mining claims. In other words, he has the same rights as he had under the old law in respect to the claims that are in force and effect at the time the homestead application is filed.

Function of the General Land Office

Realizing that the stock-raising homestead law would cause considerable friction between homestead claimants and prospectors, particularly in a section of the country where mining is one of the principal industries,

*Publication approved by the Commissioner of the General Land Office.

the U. S. General Land Office, through its Field Division offices, adopted the policy more than five years ago of endeavoring to assist in the settlement of disputes arising over conflicts of interests under this law. Many such disputes have been settled in this way with little if any expense to those involved, and the Field Service of the General Land Office is constantly engaged in trying to settle other disputes that may arise.

Unfortunately, many persons throughout the public land states do not know or understand that this has been the aim and policy of the Field Service of the General Land Office, and do not know that by presenting their complaints to the Chief of Field Division of the General Land Office having jurisdiction in their locality, he will endeavor to settle such controversies, and that this will be done in most cases with practically no expense to the persons involved.

The experience of the Field Service of the General Land Office has been that most disputes of this kind arise because the parties involved do not understand the law and consequently do not know what their legal rights are. When a representative of the government goes to them and explains the law and tells each man what his rights are, and what he can do under the law and what he cannot do, it has been the experience of the Land Department that most controversies are quickly settled.

The General Land Office wishes to assist public land claimants in all such matters, and is ready at any time to extend a helping hand in settling any controversies that arise between an agricultural entryman and a mining claimant.

Field divisions of the General Land Office are situated in the following cities:

Portland, Ore., Post Office Building.
San Francisco, Calif., Custom House Building.
Helena, Mont., National Bank of Montana Building.
Denver, Colo., Post Office Building.
Cheyenne, Wyo., Federal Building.
Santa Fe, New Mexico, Laughlin Building.
Salt Lake City, Utah, Federal Building.
Jackson, Mississippi, Federal Building.

Copper Prospects in Cuba

COPPER PRODUCTION in Cuba at one time held world significance. This was during the time when El Cobre, a few miles from the illustrious seaport of Santiago de Cuba, was in her prime. More recently Cuba has dropped in the production of copper, owing to the exhaustion of ore in El Cobre and the consequent dismantling of her entire equipment. The principal surviving producer is the Matahambre mine, which for some years has been yielding about 20,000,000 lb. annually. These facts impress upon one that it is an opportune time to call attention to a district as yet but little known or investigated.

On the dump at the Maria Antonieta mine, here seen, is 500 tons of 16 per cent copper ore

In the northwest part of the province of Camaguey, 30 km. north of the Cuba Railroad and 10 km. south of the line separating Santa Clara Province from Camaguey, lies a district that so far has received only casual investigation. Here the *sombrero de hierro* can be traced due east and west for a distance of 10 km. Scattered along this lead can be found pick-and-shovel holes, several trenches, three or four 30-ft. shafts, one 500-ft. tunnel and one mine, the Santa Lucia, that has been equipped and operated, but was later stopped for lack of transportation facilities and inability to handle the water. In every instance copper has been uncovered. From the 500-ft. tunnel, which was only 30 ft. from the surface when it struck the ore, more than 500 tons of 16 per cent copper was extracted and left on the dump, with as much in sight left in place.

The ore is a double sulphide of copper, locally called cubanite, and occurs in a brecciated zone, closely following a fault between gabbro and diorite, which are the two prevailing country rocks. In some places it is entirely within the gabbro. The best ore is found closely associated with slickensided pyroxene. Massive blocks of cubanite, sometimes 8 ft. in diameter and like raisins in a pudding, are frequent occurrences. The other extreme is fine disseminated grains, always associated with pyroxene. The vein pinches and swells and grows lean and rich without any seeming relation to the walls of the fault. This formation is within 30 ft. of the surface.

The one thing holding back the development of this district and, more broadly speaking, the progress of Cuba, is lack of roads and means of transportation.

Even in the cane fields, where transportation from cutting field to spur track is one of the large items of expense, ox carts are used. These are slow and tortuous and with an excessive load of four to five tons on the two 3-in. steel tires, cut through any dirt road that could be made. During the rainy season, carts loaded with 5 tons of tobacco are dragged through miles of slush up to the withers of the oxen. It is not uncommon for a load going a distance of 20 km. to be a week on the road.

There is, however, the Cuban Central Railroad, which passes within 10 km. to the north of this district. To this a truck road could be built without exorbitant expense and later on a spur track could be laid. The topography is low and rolling and crosses an igneous country which offers a better possibility for a permanent truck road.

Embraced within this prospective copper district are the Santa Lucia mine, which has to its credit a small production of good ore; the Maria Antonieta mine, with 500 tons of 16 per cent copper ore on the dump and as much more in sight, and several prospects scattered along the lead, all showing good indications of copper. Here is a district that is well worth investigating.

The Analysis of Xanthate

Flotation Operators, Until Now, Have Had No Reliable Method of Determining the Purity of What They Get

By W. S. Calcott, F. L. English, and F. B. Downing
Flotation Laboratory, E. I. du Pont de Nemours & Co., Inc., Wilmington, Del.*

THE USE of xanthate in the concentration of sulphide ores by flotation has now become widespread, the most popular of the xanthates being the potassium and sodium salts of ethyl xanthate. Metallurgists have been unable to determine the actual xanthate content of commercial xanthates, because heretofore no accurate method of analysis has been published or communicated to them. It has, therefore, been difficult to evaluate properly the several kinds and grades of xanthate offered for sale, and to determine the degree of uniformity of the shipments of these products. Common impurities in commercial products are water, ethyl alcohol, potassium or sodium carbonates, and complex oily compounds rich in sulphur.

The most common method for the estimation of xanthate is the determination of the total sulphur of the sample, and, assuming this sulphur to be the sulphur of the true xanthate, its direct calculation to xanthate. As other sulphur-containing bodies are generally present in commercial xanthate, the method gives inaccurate results and its use has led to many erroneous assumptions by manufacturers and consumers of xanthate. At least one mining concern has been accustomed to apprize all the material soluble in alcohol as xanthate. In the presence of other alcohol-soluble bodies, this method will obviously give high results.

Because of its interest to the mining industry and to its own manufacturing program, the Du Pont Flotation Laboratory undertook the necessary research work to develop the method of analysis, which is here presented by its authors in detail.

Principle and Application of the Method

The xanthate is precipitated as the copper salt from a slightly alkaline solution using a copper sulphate-sodium tartrate reagent, filtered off and decomposed with nitric acid. The copper is then determined by titration with 0.1 N. sodium thiosulphate.

$$2\left(S=C<\begin{matrix}OC_2H_5\\SK\end{matrix}\right)+CuSO_4 \longrightarrow Cu<\begin{matrix}S-CSOC_2H_5\\S-CSOC_2H_5\end{matrix}+K_2SO_4$$

$$CuSO_4+2KI \longrightarrow CuI+I+K_2SO_4$$

The method has been applied to both pure and crude materials. The results are not affected by the presence of xanthyl disulphide, the diethyl xanthate derivative, or such impurities as thiosulphates, sulphites, or carbonates.

The presence of sulphides or potassium thiocarbonate (K_2CS_3) causes high results, but as these impurities have been found absent in properly manufactured commercial products, examination for their presence is limited to qualitative tests. Duplicate determinations of potassium xanthate require approximately four hours and should check within 0.5 per cent of the amount present.

*Right of republication is reserved by E. I. du Pont de Nemours & Co., Inc.

(a) Copper sulphate-tartrate solution. Dissolve 25 g. of $CuSO_4.5H_2O$ in 600 cc. of hot distilled water, cool to room temperature, and add 200 g. of c.p. sodium tartrate. After complete solution of the tartrate, slowly add 10 per cent Na_2CO_3 solution until the color of the reagent turns to dark blue and the reagent is just alkaline to litmus, indicating an excess of Na_2CO_3; then dilute the solution to a volume of one liter, and filter.

(b) 0.1 N. sodium thiosulphate solution. The standard sodium thiosulphate solution must be standardized against 0.2 to 0.3 g. samples of pure copper which have been dissolved in 30 cc. of 2:1 HNO_3 (by volume) in 500-cc. Erlenmeyer flasks and treated according to the procedure for the estimation of copper in xanthate described in the procedure below.

Calculation

$$\frac{\text{wt. of sample}}{\text{cc. } Na_2S_2O_3 \times 0.06357} = \text{Normality of thiosulphate.}$$

Procedure for Qualitative Tests and for Xanthate Determination

(a) Sulphides. Dissolve a 1-g. sample in 100 cc. of cold water and add a few cc. of a 2 per cent aqueous solution of sodium nitroprusside. The immediate appearance of an intense reddish violet coloration indicates the presence of appreciable quantities of sulphides. Report presence or absence of sulphides.

(b) Thiocarbonates. Dissolve a 1-g. sample in 50 cc. of cold distilled water and add 5 cc. of 10 per cent lead acetate solution. The curdy precipitate formed should be cream colored or almost white. If a brown or red precipitate is obtained, the presence of thiocarbonates is indicated. Report presence or absence of thiocarbonates.

(c) Potassium xanthate. Dissolve a 1.5-g. sample in 300 cc. of cold distilled water in a 500-cc. Erlenmeyer flask and slowly add with agitation 125 cc. of the copper precipitating reagent. Close the flask with a rubber stopper and immerse it in a bath of ice and water. Allow the mixture to stand with occasional shaking for at least one hour but not more than three hours; then filter off the yellow precipitate upon a large (30 cc.) Gooch crucible containing an asbestos mat, and wash precipitate and flask thoroughly with cold distilled water. Avoid allowing the precipitate to suck dry and cake during washing.

Place the Gooch crucible containing the precipitate in a 400-cc. beaker covered with a watch glass and pour into the Gooch 30 cc. of 2 parts conc. HNO_3 to 1 part water by volume (Hood). Allow the mixture to stand for five minutes; then rinse and remove the Gooch crucible and place in it a thin mat of asbestos fibre. Filter the copper nitrate solution containing the oily products of decomposition of the xanthate and the asbestos fibre through the Gooch crucible and wash with water. Return the filtrate and washings to the

original 500-cc. Erlenmeyer flask, add 15 cc. of conc. H_2SO_4 and a dozen small glass beads, then boil the solution in the hood until the nitric acid is completely expelled and dense fumes of SO_3 fill the flask. Allow the flask to cool, then dilute to 100-125 cc. with distilled water and again cool to room temperature. Add conc. NH_4OH to the solution until a slight excess is present, as indicated by the appearance of an intense blue color. Boil off any excess ammonia, then cool the solution to room temperature and acidify with exactly 7 cc. of glacial acetic acid.

Dissolve 5 g. of c.p. potassium iodide in the solution, then titrate the iodine liberated with 0.1 N. sodium thiosulphate using 10 cc. of 0.1 per cent starch solution as indicator.

Calculation

$$\frac{\text{cc. } Na_2S_2O_3 \times \text{Normality of } Na_2S_2O_3 \times 32.06}{\text{Wt. of sample}} = \text{per cent potassium xanthate}$$

$$\frac{\text{cc. } Na_2S_2O_3 \times \text{Normality of } Na_2S_2O_3 \times 28.84}{\text{Wt. of sample}} = \text{per cent sodium xanthate}$$

Experimental Data on Use of Method

Typical analyses of pure potassium xanthate follow in Table I. The pure potassium xanthate was prepared from absolute alcohol, pure carbon bisulphide and carbonate-free potassium hydroxide. The product was then recrystallized from 95 per cent alcohol, washed with ether, and vacuum dried. A total sulphur analysis indicated a purity of 99.4 per cent.

Application of the method of analysis to commercial products (Table II) revealed the unsatisfactory nature of the present methods of analysis.

Although doubtless the "sulphur method" has been the cause of many false conclusions in the determination of the purity of commercial xanthates, and in the interpretation of flotation efficiencies, we do not wish to minimize its importance, when used in connection with the "copper" method, as an indication of the presence of sulphur-bearing impurities.

An investigation is now in progress to devise a method for the direct determination of these impurities.

Table I—Analyses of Potassium Xanthate by the Copper Precipitated Method

Purified material, 99.4 per cent by sulphur analysis. Sodium thiosulphate normality = 0.1031

No.	Sample, Grains	Thiosulphate Consumed, Cubic Centimeters	Purity Found, Per Cent
1	2.0000	60.17	99.4
2	2.0000	60.25	99.6
3	1.0000	30.00	99.2
4	1.0000	30.10	99.5
5	1.0000	30.05	99.3
6	1.0000	30.11	99.5
7	2.0000	59.85	98.9
8	2.0000	59.92	99.0
9	1.0000	30.10	99.5
10	1.0000	30.12	99.6

Table II—Comparative Analyses of Commercial Potassium Xanthate

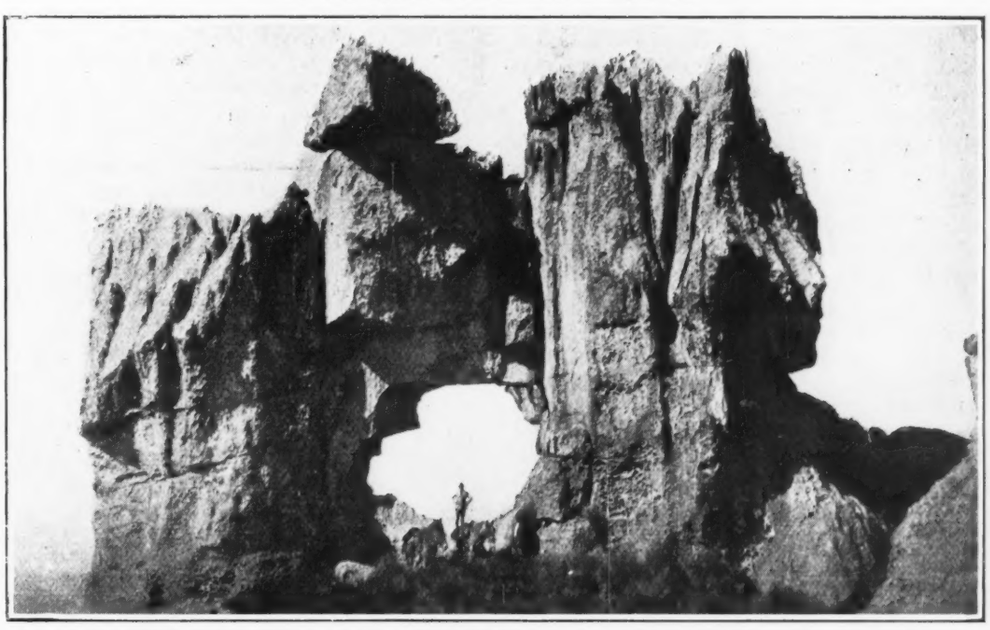
No.	Sample	Purity Claimed	Purity by Copper Method	Purity by Total Sulphur
1	Solid	95—98	80.5	83.5
2	Solid	90—93	83.9	86.7
3	Liquid	50—55	49.5	(a)
4	Solid	90—92	90.4	92.1
5	Solid	90—92	90.1	92.6
6	Solid	90—92	90.1	93.0
7	Solid	95—97	94.5	96.3
8	Solid	95—97	94.5	94.3
9	Solid	95—97	95.0	96.4

(a) Rich in Sulphides.

Houghton to Have New Building

The new Metallurgy Building under construction at the Michigan College of Mines, Houghton, Mich., will be completed next year. When it is ready, two new courses, electrometallurgy and metallography, will be added to the curriculum. The equipment will include suitable laboratories and furnaces. The ore-dressing laboratory has been designed after extensive observation of the laboratory of the U. S. Bureau of Mines at the University of Minnesota and the laboratory of the Massachusetts Institute of Technology. Denver ovens and gas and electric muffles will be installed for assaying; also, the best type of microphotographic apparatus.

In the Rock Forest of Junin, Peru



The Triumphal Arch. Note the three horses and man standing under the arch

Discussion

Origin of Certain Carbonaceous Materials

THE EDITOR:

Sir—In your editorial entitled "Carbonaceous Matter and Metallic Ores" in the Aug. 9, 1924, number of *Mining Journal-Press*, the position you take that the bituminous matter and carbon associated with metallic ores suggest, at times, an incontrovertible inorganic origin, is a point well taken, in my opinion.

A casual reading of the geological literature extant today would give one the impression that carbon is an element which by some chance or another always existed at or near the surface of the earth, and was never of a magmatic origin. The carbonaceous matter in shales is said to be of vegetal derivation; petroleum is stated to have been derived from vegetal matter or from marine animal bodies; if carbon or bituminous matter is found in igneous rocks or associated with metallic ores, the statement is made that the deeply buried carbonaceous sedimentaries were undoubtedly the source from which such carbon or bituminous matter was derived. This I do not consider a reasonable or common-sense view of the matter. Carbon is one of the elements of which the earth is composed. It is an element formed as all the rest were formed, and must be as common to the interior of the earth as the rest of the eighty-odd elements so far discovered. When it is considered that all of the igneous rocks at the surface of the earth, as well as those in depth to such a point as the crustal zone extends, are undoubtedly charged in goodly quantity with the elements which go to form the gaseous, liquid, and solid hydrocarbons, and when it is considered that the quantity is so great as to comprise an almost limitless source from which the comparatively limited deposits of hydrocarbons could have been formed, it is surprising that so little consideration has been given to the possibility of their origin from these gas-charged rocks, or, better still, from the source from which the elements were derived which form the gases with which the rocks are permeated.

Graphite and amorphous carbon are widely found in nature. They are often found in metallic ore deposits, and are often plentiful in metamorphic rocks. That these forms of carbon were deposited at a comparatively high temperature would appear to be indicated by their mineral associations. It is a well-known fact that in distilling oil shale, if the evolved vapors are not promptly removed to a cooler environment as they are formed, they tend to break down into permanent gases, carbon, and the heavier hydrocarbons. This same condition occurs in firing fresh coal on an incandescent bed of coals in a furnace. If there is not sufficient air immediately mixed with the rapidly evolved gases to consume them, carbon as soot separates out in large volume, and it appears to take on a chemical or physical condition which makes its combustion, when once formed, exceedingly difficult.

I infer that it is something analogous to these examples cited, that takes place when magmatic hydrocarbon mineralizers invade igneous and metamorphic rocks. Amorphous or graphitic carbon is deposited, while the hydrogen and the fixed hydrocarbon gases escape to the surface or are retained in the rocks. The same process would be operative where these mineralizers chanced to approach the surface within quartz veins.

The finding of carbon in gold-quartz ores is of common occurrence, and its presence in other kinds of metallic ores is occasionally recorded, as is shown by a perusal of the literature on ore deposits. For the matter of discussion two greatly productive gold districts will be mentioned, namely, Porcupine and the Witwatersrand.

A number of writers have remarked on the carbon in the Porcupine ores, and the assigning of it to organic sources was made difficult because of the Archean age of the inclosing rocks. In writing of the association of carbonaceous matter with metallic ores, J. E. Spurr cogently sums up the matter on this point in the following words[1]:

> "Returning to our starting point, the carbon veins or 'slips' of Porcupine, it is difficult to admit in this case an organic origin. The carbon came up and was deposited along certain fault fissures at a definite period of time, sharply defined with relation to the other geologic events, almost—or quite—as if it were a stage of the magmatic sequence. It is by no means proved that it was such, but it has that appearance. The rocks which inclose the carbon veins are the Keewatin schists and later intrusives. The Keewatin rocks are old volcanics, and are the earliest known rocks. No life accompanied them or preceded them, so far as we know. It has always been believed that these were truly the Azoic rocks—the records of a lifeless era."

H. S. Robinson[2] records a few data in connection with the carbon associated with the ore of the No. 5 vein of the McIntyre mine. Fig. 110, accompanying his article, shows the carbon-impregnated ore occurring as a distinct shoot in the main orebody; and of the carbonaceous faults cutting the vein he makes the following statement:[3] "The intersections with the vein form a zone pitching to the east 30 deg."

Regarding the oreshoot of this vein Percy E. Hopkins says:[4] "The northerly No. 5 vein, which dips steeply to the northwest, has an extremely long oreshoot (1,500) which rakes steeply to the northeast." He further says in speaking of the Dome mine:[5] "The veins strike a little north of east and dip nearly vertically, presenting a large low-grade egg-shaped deposit, pitching about 45 deg. on to the Dome Extension." For the quartz porphyry stock Robinson says:[6] ". . . the stock pitches to the east at an angle of 50 deg."

Thus we have, where it is outlined, a carbon zone, an

---

[1] "Carbonaceous Matter and Metallic Ores," editorial, *Mining Journal-Press*, Aug. 9, 1924, pp. 202-203.

[2] "Geology of the Pearl Lake Area, Porcupine District, Ontario," *Econ. Geol.* Vol. XVIII, No. 8, December, 1923, pp. 753-771.

[3] *Op. cit.*, pp. 766-767.

[4] "Ontario Gold Deposits," Trans. Can. Inst. Min. and Met., Vol. XXV, 1922, p. 43.

[5] *Op. cit.*

[6] *Op. cit.*, p. 758.

oreshoot, a quartz body, and an intrusive rock mass, all with the same general eastward pitch, and all apparently the result of a sequence of magmatic activity emanating from the same general locus of magmation. Why deny the carbon a magmatic origin, when any other mineral occupying the close genetic relationship which the carbon does to the associated magmatically derived bodies would unhesitatingly be accepted as being also of magmatic origin? The relation of the carbon in the veins to the admittedly magmatic phenomena, and the mode of its occurrence in the "flow tops" and dike of porphyry at the McIntyre mine,[7] precludes any possibility of its being of organic origin.

For the carbon in the ores of the Witwatersrand, C. B. Harwood,[8] shows that it could have had none other than a magmatic origin. He shows[9] that the carbon occurs in "small, black, opaque nodular grains, having a somewhat warty dull surface. . . . also in veinlets, up to two millimeters thick, with a columnar structure, the columns being perpendicular to the walls; and, between the columns, thin films of sericite are generally present."

In part he says of the association of the carbon with the gold:[10]

". . . Gold can be found not only as a film on the particles of carbon but it has also been observed, by the writer, actually imbedded in the carbon. He has also seen in Rietfontein and Randfontein specimens the columnar structure (which Young noticed in the carbon) in both gold and carbon, the former being inclosed within the latter. In examining under the microscope thin sections of banket showing carbon from the Carbon Leader and Buckshot Reef from Rietfontein, from the Randfontein Leader, and from Buffelsdoorn, the writer found that the most noticeable features are the intimate association and intergrowth of the carbon with gold, the latter not only frequently lying round the carbon grains, but also occurring as particles entirely surrounded by carbon, while the carbon grains often contain minute specks of gold scattered through them. . . ."

He further cites the frequent close association of the carbon and pyrite of the bankets, and also presents evidence going to show that quartz has been replaced by carbon. The diabase dikes associated with the ores of the Rand he also found to contain carbon in appreciable quantities; and, the conclusion at which he arrived—that the carbon had been derived from "magmatic vapors or solutions"—was entirely justified by the evidence he presented.

The apparent ability of carbon to replace other substances is also mentioned by F. W. Clarke, in his remarks on the origin of graphite, in which he says, in part:[11] "Its commonest occurrences are in the crystalline schists, in which it often seems to replace mica."

The evidence of the occurrence of the carbon at both Porcupine and the Witwatersrand admits of but one construction—that of its inorganic origin. This being the case, why not tentatively accept as inorganic in origin similar occurrences occurring under similar conditions, except that the rocks inclosing the ore deposits are of a more recent age? Why is it so insistently necessary to "stew" the carbonaceous material, found associated with ore deposits, out of the adjoining rocks? This conception seems so superficial.

JACOB W. YOUNG.

Montebello, Calif.

[7]H. S. Robinson, *Op. cit.*, p. 768.
[8]"The Rand Banket." *Min. and Sci. Press*, Vol. 107, 1913.
[9]*Min. and Sci. Press*, Nov. 22, 1913, p. 811.
[10]*Op. cit.*, p. 811.
[11]"Data of Geochemistry," U. S. Geol. Surv., Bull. 616, 1916, p. 327.

How to Make Voting Worth While

THE EDITOR:

Sir—In your editorial of Nov. 1 entitled "Do Your Voting" you bemoan the lack of appreciation of the right of suffrage exhibited by all classes of society, from the laborer who won't vote unless compensated for lost time up to the mining engineer who "does not desire to rule or to vote . . . but to be given a job, treated kindly, and fed regularly." It is probable that more laborers would vote gratis if elections were held on Sundays, as in Latin America, but really the problem lies deeper and arises from the well-founded suspicion of the citizen that his vote has little effect on the ensuing government.

The absence in our legislatures of a true reflection of public opinion and the inadequacy of direct legislation as a substitute, owing to the incompetency of the average citizen for the resolution of complicated public problems, was accurately described by William Crocker in *Mining Journal-Press* of May 24, 1924. While the concurrent voting advocated by Mr. Crocker would doubtless be better than our present crude system, an even better plan is already a success for the choice of parliaments in Belgium, Holland, Germany, Switzerland, Austria, Czechoslovakia, Jugo-Slavia, Poland, Denmark, Sweden, Norway, Lithuania, Esthonia, Latvia, Finland and last, but not least, the Irish Free State. I refer to proportional representation, of which the Hare system, advocated by the Philanthropic Proportional Representation League of Philadelphia, is the most perfect form.

Under the present system of one representative from each geographical district, not only are the minority parties in each district without representation in the resulting legislature, but a small block of voters, in any district where two political parties are evenly balanced, can and often does intimidate the candidates of both parties, before election, into making secret pledges to obey the block's behests in the legislature. This weakness of our representative system has long been known to practical politicians and has been used by countless special interests to gain their ends, such as the Grand Army and the tariff tinkerers, and by the Anti-Saloon League as well as by John Barleycorn.

With proportional representation, on the contrary, a state legislature would accurately reflect the voters, because every member to be elected must receive a solid block of votes equivalent to the total vote of the state divided by the number of legislators to be chosen. Thus a legislature would be in miniature to the state what the New England town meeting (the ideal of democracy) is in gross to the township. And as the legislators will thus accurately reflect the political complexion of the voters, every citizen will feel it worth his while to cast a ballot. Such a legislature will behave far differently from the present ones, which, at the best, represent merely the majority party in each district and, at the worst, a small block supporting some special interest.

While the short ballot, as described by Mr. Crocker, is a decided advance over the long roll of nominees so popular with the political machines, it would generally give inferior results to the plan of abolishing altogether the direct election of administrators. By this scheme the voters do their part by choosing only the legislators and these later appoint the executive officials. This is merely imitating in public life the plan long followed

by the stockholders of private corporations who choose a board of directors and entrust to this board the appointment or election of the managing staff.

In the United States, the manager plan of city government is founded on this last principle, and when the municipal council is chosen from the city at large by the Hare system of proportional representation, as at present in Cleveland and Ashtabula, we have the ideal plan. Besides the general opposition of machine politicians, who naturally do not favor suicide, we have local causes retarding the progress of proportional representation. In the South, the Democratic Party fears it because of the negro vote. In England, the Labor Party advocated it, until it took office this year, when it rejected it on a test vote. This sacrifice of principle to the greed for an unfair dominance has not long remained unpunished, for had proportional representation been in vogue in the recent election, the Labor Party would possess many more seats in the new Parliament.

Mexico City, Mexico. ROBERT BRUCE BRINSMADE.

Golden's Ore-testing Laboratory

THE EDITOR:

Sir—Your editorial entitled "The Socialistic Trend," which appeared in the *Mining Journal-Press* for Oct. 11, 1924, surprised me very much, and I was even more surprised by a critical discussion which appeared in a later issue. No one can for a moment doubt that the ore-testing plant at the Colorado School of Mines is being run entirely in accordance with the ethics of the situation, and it is hard to understand the criticism which has been made in view of the great need for testing plants of this kind.

In your editorial of Oct. 11 you make the very obvious comment that "the soundest plan is to frown upon the doing of work by the government which private skill and capital can do." This statement is quite true, but it is equally obvious that private skill and capital have not been able to maintain ore-testing plants such as is available in Golden. Without this well-equipped plant and the broad-minded policy which maintains it the mining industry would suffer materially.

The favorable comments made by a large number of representative mining engineers which appeared in a recent issue of the *Mining Journal-Press* undoubtedly show the general opinion of the profession.

Brooklyn, N. Y. R. L. HALLETT.

Another Arsenic Smelter

THE EDITOR:

Sir—The name of the Chipman Chemical Engineering Co. is missing from the list of arsenic smelters and refiners given on page 862 of your issue of Nov. 29, 1924, volume 118, No. 22. We have for the past year been operating an arsenic smelter at Peyton, near Martinez, Calif., with a present capacity of about thirty tons of ore, or ten tons of arsenic daily, although for a while our plant was shut down by a fire. Our present plans contemplate enlarging the smelter next spring to a capacity of about thirty tons of white arsenic, or 100 tons of ore daily, and installing a refining furnace.

Ores for economic handling at this smelter are available from many different sources as widely separated as British Columbia, Washington, Nova Scotia, west coast of Mexico, Utah, Nevada, and California.

As we are probably the largest consumers of arsenic in the world, our requirements amounting to over 5,000 tons of arsenic annually, we have not yet offered any of our arsenic for sale, but we expect to be in position to do so after enlarging our plant. It will probably be possible to operate the enlarged plant at a profit even though arsenic is selling as low as 6c. per pound.

We would appreciate your correcting in an early number the omission of the name of our company from the list of arsenic producers.

T. H. POWERS FARR, JR.,
Production Manager,
Chipman Chemical Engineering Co.
New York.

Sulphur as Fertilizer

THE EDITOR:

Sir—May I say a word on the subject of sulphur as a fertilizer, to which you are giving some attention? Some years ago when I was engaged on an investigation of acid pollution of river waters in the Pittsburgh district for the U. S. Engineering Office, it was learned that the precipitate made from mine water by neutralization with limestone had a fertilizing action. The mine water contained principally ferric sulphate, and the precipitate was commonly spoken of as ferric hydrate, although it seems probable that it may have been a basic ferric sulphate of uncertain composition. The ferric sulphate in the mine water is, of course, a result of the oxidation of pyrite. It occurs to me that the fertilizing action of pyrite mentioned in your columns may be due to the same things, giving rise to such action in the case of the mine water precipitate. Pyrite would, of course, oxidize in the presence of air and water, probably forming ferric hydrate, and the iron sulphate would probably follow the same course.

Apparently too little is known of the chemistry of plant growth to permit any positive statements with regard to the beneficial effects of either sulphur or iron, but I suggest that whatever effect is caused by pulverized pyrite, iron sulphate, and the precipitate from ferric sulphate water, is probably due to the same agents. The subject is one which seems worthy of intensive research. C. M. YOUNG.

Lawrence, Kan.

The Basic Principle of Standard Money

THE EDITOR:

Sir—In your issue of Nov. 22 you say, editorially, "The fixed price of gold rankles some of the gold producers, who see no reason why the manufacturing jeweler should not pay more for his gold than $20.67 per ounce. And, also, "While the American Mining Congress is hoping to boost gold to $30 an ounce, the *Scientific American* is traitorously trying to cut the price to $5."

In what follows I have tried to explain precisely why neither of those hoped-for conditions can be brought about: Our first dollar, coined under the law of 1792, consisted of 416 grains of silver, 89.243 per cent fine; therefore it contained 371¼ grains of pure silver. Prior to that time, a Spanish silver piece, also called a dollar, was commonly accepted as the unit of monetary value in this country, and the quantity of silver in our dollar was made to equal that in the Spanish dollar, so as not to disturb trade or business.

In addition to the silver dollars, gold was minted

into coins called the eagle, half-eagle and quarter-eagle, which contained 247.5, 123.75, and 61.875 grains of pure gold, respectively, and were worth ten, five, and two and one-half dollars in silver at the coinage ratio of 15 to 1 which was, also, the commercial ratio at that time; there was no such thing as the gold dollar then.

At the coining rate of 371.25 grains to a dollar, an ounce, 480 grains, will provide enough silver to make 1.2929+ silver dollars; therefore silver was said to have been worth $1.29+ per ounce. And, since the eagle of 247.5 grains of gold was worth ten silver dollars, 24.75 grains of gold was worth one dollar in silver; and an ounce, or 480 grains of gold, was worth $19.3939+ (480 divided by 24.75) in gold. However, the mint that was authorized in our first coinage laws had barely begun operating before the commercial ratio between silver and gold changed so much that it required more than 371.25 grains of silver to equal in value 24.75 grains of gold; consequently our gold coins disappeared from circulation as money, and our attempt at bimetalism failed.

In 1834, an attempt was made to restore gold for use as money and the amount in the eagle (half- and quarter-eagle in proportion) was reduced from 247.5 grains to 232 grains and again, in 1837, it was brought up to 232.2 grains, at which quantity it has remained ever since.

In 1849 our first gold dollars were coined to serve in place of the silver dollars that had disappeared from circulation.

The United States has been on a gold basis, practically, since 1837; when our government "fixed" the "price" of gold at $20.67 per ounce in terms of gold and it will remain "fixed" at that "price" just as long as the dollar *is* 23.22 grains of gold; because what is commonly called its "price" is really its coining value.

Similarly, the "price" of silver is $1.29 per ounce in terms of silver dollars of 371.25 grains each, because that is the coining value of silver, as it was "fixed" by our government 132 years ago; and the "price" of silver in terms of silver will remain at $1.29 per ounce just as long as 371.25 grains is one silver dollar.

From time immemorial the promptings of human nature have induced mankind to select one substance or commodity out of all that are available, as *the* standard in terms of which all other commodities are valued; therefore, it follows that all values, as measured in terms of such standard, are relative or comparative, in a trading or swapping sense. And if gold be chosen as such standard and the prices of all other commodities are expressed in terms of gold, it *must* follow, conversely, that the price of gold *must be* expressed variously in terms of all other commodities; and that, since all prices are relative or comparative, it is impossible to express the "price" of anything in terms of itself; therefore, the real "price" of gold *is* expressed in terms of something else than gold; for, otherwise, there can be no *comparison* of swapping value.

Such trading or swapping value or "price" is most conveniently expressed in terms of a *definite* and *particular quantity* of the standard of value; which quantity of the standard is, in turn, called the standard *unit* of value; and, when one is considering the subject of monetary prices, it is of the utmost importance to have a very clear and concise understanding of what constitutes the difference between the standard of value and the standard *unit* of value; but it would seem that very few really comprehend what that difference is.

Of course, each nation or country has the privilege of choosing its own standard of swapping value and, likewise, of determining upon, arbitrarily, its own standard *unit* of value. And, to repeat, when our government, in 1837, enacted the law that declared 23.22 grains of gold to be a dollar, it made the coining value of gold $20.67 per ounce, and that action "fixed" what is commonly—though erroneously—called the "price" of gold (in terms of gold) for just so long as the dollar of the United States consists of 23.22 grains of gold, whether the remainder of the world is on a gold basis or a silver basis or any other basis.

Hence, to illustrate the operation of this basic principle of standard money, should the United States just now change from a gold standard to a silver standard and declare the dollar to be 23.22 grains of *silver* (instead of gold) then the "price" of silver, in this country, would be "fixed" at $20.67 per ounce in terms of such silver dollars. And, other things being equal, wheat, now quoted at $1.53 per bushel (35.53 grains of gold), would be worth $45.90 (1,066 grains of silver) per bushel in terms of such silver dollars! (Present ratio of silver, at 68.875c. gold per ounce to gold at $20.67 per ounce is as 30 is to 1—$20.67 divided by 68.875c. = 30).

But a farmer receiving $45.90 in *silver* dollars of 23.22 grains each would be no better off than if he received $1.53 (35.53 grains) in gold, because he would receive in the one case 1,066 grains of silver and in the other its equivalent in gold at the commercial ratio of 30 grains of silver to 1 grain of gold (1,066 grains silver divided by 30, the present ratio, equals 35.53 grains of gold; and 35.53 grains of gold divided by 23.22 grains—$1—equals $1.53 in gold).

In the light of the foregoing explanations of the way in which the government has "fixed" the "price" of gold (and silver) "arbitrarily," how can the manufacturing jeweler be compelled to pay more for his gold than $20.67 per ounce when the standard unit of value, which has been named "the dollar," is 23.22 grains of gold?

Our only real dollar *is* 23.22 grains of gold, and an ounce troy is 480 grains, and just as long as these two fundamental conditions obtain just so long will an ounce of gold be 20.67 dollars.

Again, "the American Mining Congress is hoping to boost gold to $30 an ounce." How? By reducing the amount of gold in the dollar to 16 grains ($480 \div 16 = 30$), or by increasing the weight of the ounce to 696.6 grains ($23.22 \times 30 = 696.6$)?

"The *Scientific American* is traitorously trying" (by transmutation or by synthesis?) "to cut the price to $5." How? By reducing the weight of an ounce to 116.1 grains ($23.22 \times 5 = 116.1$) or by increasing the weight of the gold dollar to 96 grains ($96 \times 5 = 480$)?

Finally, the Act of Congress of March 14, 1900, declares, in part, that "The dollar, consisting of twenty-five and eight-tenths grains of gold nine-tenths fine . . . shall be the standard unit of value."

Please take notice that the act says "*The* dollar"—not *a* dollar.

Grammatically, *the* is the definite article; *a* or *an* is an indefinite article. Consequently, there is but one real dollar in the United States, and that one is 25.8 grains of gold nine-tenths fine, and it is our sole standard unit of value, according to the United States statutes.

W. DE L. BENEDICT.

New York.

News of the Week

The Mining News of ENGINEERING AND MINING JOURNAL-PRESS is obtained exclusively from its own staff and correspondents, both in the United States and in foreign fields. If, under exceptional conditions, material emanating from other sources is published, due acknowledgment and credit will be accorded.

Summary

NEW discoveries of high-grade silver ore in the Cobalt district in northern Ontario may prove highly important. Reports of new finds come from Gillies Limit and from the Nipissing property at Cobalt.

The Ophir-Colorado Mines Co. has completed the erection of a new flotation plant at the old Carbonero property at Ophir, Colo., and will start operations.

The Chief Consolidated Mining Co. has increased its capitalization by 500,000 shares to keep step with "expanding business."

Joplin-Miami zinc producers profess to see a $50 market for zinc concentrate without a material increase in production.

Senator Oddie hopes to obtain authorization for continuing the work of the Senate Commission of Gold and Silver Inquiry.

The California Rand Silver mine has been optioned for sixty days at a price reported in New York to be $2,500,000.

The Duluth, Missabe & Northern Ry. has ordered fifty new steel iron-ore cars of 85-ton capacity in anticipation of increased operations in the Lake Superior iron mines.

A merger of asbestos interests in Quebec, frequently discussed hitherto without result, is again being negotiated, with probability of success.

Kirkland Lake Gold Mines Increase Ore Reserves

Lake Shore Opens $100 Ore in Main Vein on 800 Level—Wright-Hargreaves Completes Mill Alterations

The Lake Shore mine has declared a regular quarterly dividend of 5 per cent and an extra bonus of 5 per cent payable Dec. 15. Production for November was $170,000, which constitutes a new high record in the history of the company.

A big change has taken place on the 800 and 1,000 levels in the last two months. Previous to that, development had been on a parallel vein with erratic values, but crosscutting to the north picked up the main vein, which has now been proved on the 800 level for a length of 450 ft., and assays are running about $100 a ton.

The new vein on the 1,000 level of the Wright-Hargreaves has been proved for a length of 600 ft., with the face still in ore. The average assay is about $20 a ton, which has had a material effect on the mill heads. Additions to the mill are rapidly being completed, and within the last few days another Oliver filter has been put in operation. The mill was equipped with six Dorr thickening tanks in the counter-current decantation system. It is now planned to use only three tanks in series, the tailings going to the Oliver filter, where they are washed.

At the annual meeting of the Teck-Hughes company, held in New York, it was announced that the matter of a new mill would not be taken up until the new shaft had proved the ore indicated by the drills at a depth of 1,600 ft. The financial position of the company is satisfactory, and underground development is said to be favorable.

Develop Stemwinder, Next to Sullivan, in British Columbia

PORCUPINE Goldfields Development & Finance Co., subsidiary of the Consolidated Goldfields of South Africa, is pushing development at the Stemwinder group, near Kimberley, B. C. The property, which adjoins the well-known Sullivan mine, has been fully equipped with machinery; the shaft will be deepened, and indicated orebodies will be developed by levels and crosscuts. For the present, development at the North Star mine will be confined to diamond-drilling. Charles C. Starr is in charge of operations.

Use Pennsylvania Coke at Trail Smelter, in British Columbia

In reply to an enquiry as to whether the closing of the Crow's Nest Pass Coal Co.'s Coal Creek colliery would affect the output of the Trail smelter, S. G. Blaylock, managing director of the Consolidated Mining & Smelting Co. of Canada, stated that his company was buying coke from Pennsylvania delivered at the smelter at a cheaper rate than could be delivered from Fernie, B. C.

Mill of Arlington Mining Corporation Nears Completion

Algernon Del Mar Has Devised Treatment for Low-Grade Gold Ore — Will Use Amalgamation and Concentration

The decision of the U. S. Supreme Court in favor of the Arlington Mining Corporation, of Los Angeles, whereby an undisputed title was obtained to claims in the San Bernardino mountains, California, has permitted the consummation of plans for the development of the property and the erection of a mill, which is expected to go into operation early in 1925. The venture has been developed by R. K. Voorheis, secretary-manager of the corporation, and Algernon Del Mar, well-known mining engineer and metallurgist. The ore is a shattered limestone, the gold being found in association with siliceous intrusions.

A cheap and efficient method of treatment has been evolved that takes advantage of the fact that a preliminary discarding of coarse material permits an effective concentration of values, whereby mill treatment is confined to a part only of the tonnage mined. Experimental work to date indicates that concentration and amalgamation will be practiced as fundamental extraction and recovery methods, with provision for cyanidation subsequently should this prove desirable. The outcome of the venture, it is confidently hoped, will serve to demonstrate the opportunity that exists for the exploitation of low-grade gold ore deposits under the guidance of experienced technicians.

Will Reopen Ground Hog Mine, at Silver City, N. M.

Property Shut Down During Post-War Slump—Well Equipped—Lead and Copper in Ore

A. H. Gunnell, general manager of the Sierra Metals Corporation of Oregon, associated with Fred W. Richard, of Courtland, Ariz., and J. W. Hayward, of Tucson, have just purchased the Ground Hog mine, near Silver City, N. M., from J. B. Gilchrist, of Silver City, and his associates, at a reported price of $100,000 divided into several deferred payments. Mr. Richard has personally assumed active management at the mine and has moved his family there.

The Ground Hog mine has produced about $250,000 in smelter returns from lead-copper ore carrying substantial values in gold and silver. It was shut down following the post-war slump. The metal values have been approximately half and half in lead and copper, with a slight zinc contamination.

The mine workings extend to a depth of 300 ft. A modern surface plant, including compressor, drills, pumps, hoists, sharpener, and other equipment, is available. The mine is situated on the famous Ivanhoe fault, on which are also situated the Denver, Lucky Bill, San Jose, Goodyear, and Ivanhoe mines. The last is nearly 100 years old and is now part of the Chino Copper mine, at Santa Rita.

Active work has already been started, deepening the shaft 35 ft. to a new level beneath the 200 level, where ore has been proven by several winzes.

This mine is noteworthy in that at no point does the vein show on the surface, there being a heavy flow of rhyolite covering all of the fault southward from the San Jose mine. The vein and ore was not discovered until almost a 100 ft. of sinking was done from the surface.

New Company Consolidates Interests in Joplin-Miami Field

The Consolidated Lead & Zinc Co. has been organized in the Joplin-Miami field with an authorized capitalization of $500,000 to take over three active companies or partnerships and a half interest in another, beginning Jan. 1, 1925. The half interest is in the Hartley mine, with its 300-acre lease just west of Baxter Springs, Kan. The other companies included in the consolidation are the La Salle, the Grace B., and the H. T. The La Salle includes a 45-acre lease and mill situated in the western part of Picher. It has been owned and operated by officers and employees connected with the Eagle-Picher Lead Co.

The Grace B. Mining Co. has been operating two properties under that name, known as No. 1 and No. 2. One is in Oklahoma and the other in Kansas. The H. T. Co. has been operating what formerly was known as the Piokee mine, in the Picher camp, and including a 40-acre lease. A. E. Bendelari, vice-president for the Eagle-Picher Co., and its agent in this field, made the announcement of the consolidations that have just been consummated.

United Verde Shoots Fifty Tons of Powder at Once

One of the largest blasts ever fired in Arizona was set off on Dec. 6, by the United Verde Copper Co., at Jerome. Approximately fifty tons of black powder was packed into five loading pockets sunk into the floor of a tunnel running into the hill back of the old Glory Hole mine at the 160 level. It is the intention to ultimately remove the entire top of the hill and thus facilitate mining by steam shovel.

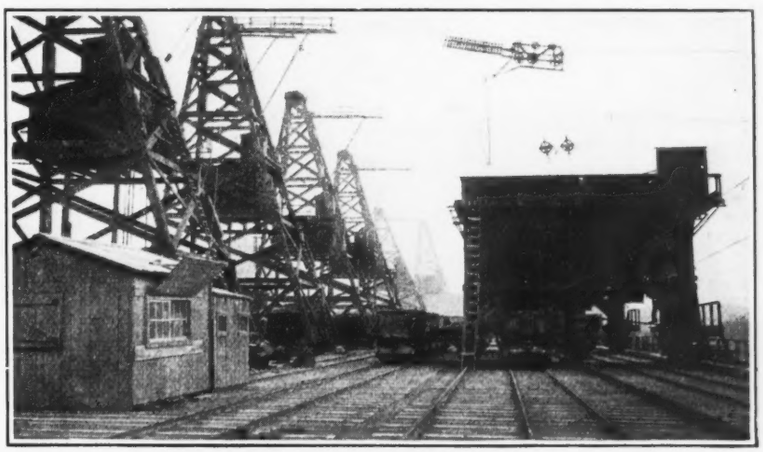
Merger of Asbestos Companies in Quebec Seems Probable

Details of Financing Being Developed—Efforts in Past Have Failed—Rhodesian Competition

A merger of the leading asbestos mining and milling companies in Quebec, long talked about, is in process of completion. Heretofore there have always been one or two companies holding aloof from any combination of interests. It is understood that now, however, all the units have recognized the wisdom of a consolidation and are prepared to merge with others. The most important producers in Quebec are the Asbestos Corporation, Asbestos Mines, Ltd., Consolidated Asbestos, Maple Leaf, General Asbestos, Bennett-Martin; in addition several asbestos consumers, such as Johns-Manville and Keasby & Mattison, operate properties of their own. The Selective Treatment Corporation, which controls a new wet process for recovering fiber, is expected to be a factor in the consolidation. It is planned to "squeeze out" the excessive capitalization of some of the companies in organizing the new corporation.

A new company will probably be formed to take over the assets of the numerous companies in the merger, stock being issued to each in return for outstanding securities. A prominent New York banking firm is at present working out the details of the consolidation for submission to those interested. It is expected that a formal announcement of the financial plans will be forthcoming at an early date. By organizing in this fashion producers hope to reduce the effect of Rhodesian competition, which is being felt most keenly.

This is not the first time that the industry has been agitated by the efforts of various persons to bring about a merger but generally these efforts have failed when negotiations reached the point of having the details ratified. Hence it would not be surprising if the present effort consumes considerable time in being consummated, but the prospects of a successful conclusion of the work appear more favorable now than they ever have been.



Cableway towers near the edge of one of the Asbestos Corporation's open-cut mines at Thetford Mines, Que.

Take Option on California Rand Silver Mine for $2,500,000

A. C. Brinker left New York on Dec. 13 for Randsburg, Calif., where he will examine the California Rand silver mine, now under a short option for a figure said to be between $1,500,000 and $2,500,000. The principals for whom Mr. Brinker is acting are not disclosed. It is understood, however, that Pope Yeatman has been retained to make a final examination if the first report is satisfactory.

The California Rand mine, discovered in 1919, was the largest silver producer in the United States in 1921 and has been among the leaders since then. A report dated Dec. 4 says that current development has been encouraging except on the fourteenth level, the lowest in the mine, where work to date has been disappointing.

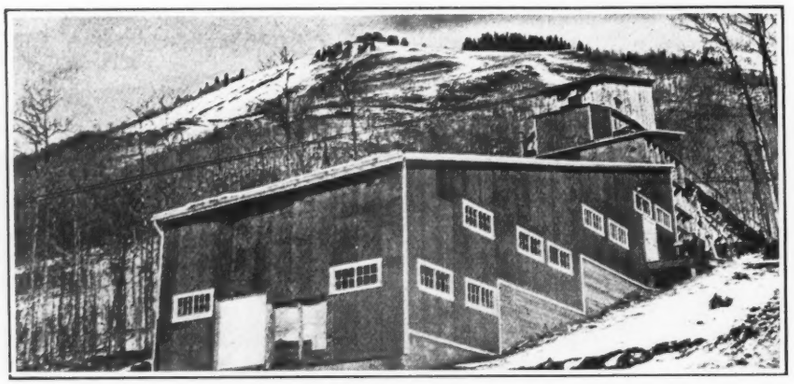
Big Five Property, Near Idaho Springs, Is Being Reopened

The property formerly owned by the Big Five Mining Co., which conducted a notorious mining promotion embracing properties in Boulder and Clear Creek counties in Colorado, a decade or more prior to 1915, has recently been taken over by a new company and operations have been resumed in Clear Creek County. The Big Five tunnel, which extends a mile or more into the mountain just above Idaho Springs, has been cleaned out and retimbered and the company announces that certain blocks of ground will be open for leasers and that development on company account will be resumed early in the coming year.

Ophir Colorado Mines Co. Starts New Flotation Plant

Lead-Silver Ore Blocked Out at Ophir, Colo.—Once Profitable Producer To Be Revived

Among the new mining projects initiated in Colorado during the present year, probably one of the most important is that of the Ophir Colorado Mines Co., backed by ex-Governor Shoup and Colorado Springs associates, who have taken over the old Carbonero, at Ophir, in San Miguel County, about 12 miles south of Telluride.



Ophir Colorado Mines Co.'s new plant

A small but modern flotation concentrator at the old Carbonero property in San Miguel County, Colo.

Work has been pushed during the greater part of the year on development and exploration, and a new 50-ton milling plant has been constructed, the initial operation of which indicates that it will successfully treat the lead-silver ore which was too low in grade to ship to the smelter. A 3,400-ft. aerial tram extends from the mill to the mines, where it is said several years' supply of ore has already been blocked out.

The superintendent in charge of the Carbonero mines and mill is C. L. Brown.

The mill equipment includes a No. 3 Universal crusher; a Ruth rod mill, 3 by 9 ft.; Plat-O concentrating tables, for rough and finishing work; an eight-cell Ruth flotation machine; a Wilfley sand pump; and an Allen sand cone. The plant was designed by J. P. Ruth, of Denver.

United Verde Will Build Modern Houses at Jerome

A building program, approximating $100,000 in cost and involving construction of twenty modern houses in Clarkdale and Jerome, Ariz., has been started by the United Verde Copper Co. At Jerome five duplex and five single houses will be erected. The duplex houses, to be constructed on the hillside, will have a two-room apartment below a four-room apartment. The single houses will consist of three rooms and bath. Of the houses to be built at Clarkdale five will contain four rooms and bath and the other five will be similar to the single houses at Jerome. It is expected that the work will be completed in about six months.

Silver Mine in Norway—Report

According to a report from Christiania, Norway, extraordinarily rich silver deposits have been found in the district of Kongsberg. The managing director of the Kongsberg Silver Mines states that the deposits are of such an extent that a period of profitable silver mining seems assured.

Active Winter Development Plan for Colorado Tungsten Mines

With the opening of winter the Wolf Tongue Mining Co. has ceased operations at its milling plant at Nederland, Colo., in the Boulder County tungsten district, and will confine operations during the winter to development work only.

The company operates a custom mill and is the principal buyer, often the only purchaser, of tungsten ores in the district. It is a subsidiary of the Firth Stering Steel Co. of McKeesport Pa., where practically the entire output of the field at the present time finds a market. The company will continue the purchase of ore during the winter from its leasers.

During the present fall, operations have been resumed on various properties which have been idle for several years and development work will be quite vigorously pushed during the winter in anticipation of a heavy demand for tungsten which operators believe inevitable with the increased activity of Eastern steel mills.

During the past year, ore and concentrates of an aggregate value of more than $100,000 were shipped from the field, the production being less than one-half of that of 1923.

Childress Lead & Zinc Co. Acquires Midas Mill and Lease

The Childress Lead & Zinc Co. recently took over the Midas mill and lease, situated south of Picher, near the Hawkeye in the Joplin-Miami field. The mill had been idle for several years, and the Childress interests took over the property only after drilling on the east end of the lease indicated good ore deposits. They have started sinking a shaft near these drill holes.

The Childress Co., which is headed by Frank Childress, of Joplin, is rapidly becoming an important factor in the production of the field. Childress is one of the original operators in the Picher section, and has been and at present is manager for the Skelton Lead & Zinc Co., one of the field's biggest producers. He also was the partner in the Moses-Childress concern, which sold out last spring to the Federal Mining & Smelting Co.

Besides the Midas, the Childress company now controls the Wade, the Fort Worth, and the Lucky Jenny mines, the latter at Hockerville, Okla., and the others at Picher.

Can Sample at Kingman En Route to Smelter Without Extra Freight

AS a result of a recent ruling of the Arizona Corporation Commission, it will now be possible for ore shipments which pass through Kingman en route to smelters at Humboldt or Hayden to be stopped for sampling at the Kingman, Ariz., ore-sampling plant without additional freight charges being made. Before the ruling the carriers were required to charge the local rate from the point of origin to Kingman and from Kingman to the smelter on shipments which were stopped for sampling.

F. M. Manson, head of the Western Ore Purchasing Co., which recently established a sampling plant at Kingman, is authority for the statement that Mohave County will soon re-enter the front rank of Arizona gold ore producers. Shipments of ore since the opening of the plant less than two months ago have exceeded expectations. Mr. Manson has established a fine laboratory in the new sampling plant and is making free determinations for miners where samples represent tonnage.

Much Activity in Mohave Gold District in Arizona

Activity in the Kingman-Oatman gold district in Mohave County, Ariz., continues. Development work on the lower levels of the Hibernia mine will be resumed as soon as new machinery can be brought in over the road to the property which is being constructed.

The Gold Dust mine has made its first shipment since being reopened, the returns showing an average value of $30 per ton. A new 100-ton ore bin is to be erected and some new development work will be undertaken. The Gold Dust mine is a mile south of the town of Oatman and is one of the oldest mines in the district, having been discovered before either the Tom Reed or the United Eastern.

The United Republic Mining Co. is sinking a winze through its newly discovered orebody. A force of men is at work at the old Paymaster mine excavating for the mill that is to be erected.

Order Fifty New 85-Ton Iron-Ore Cars

ON DEC. 6 the Duluth, Missabe & Northern R.R. placed orders for fifty new ore cars of 85-ton capacity, the largest cars that have even been used for carrying ore. The cars now in use have an average capacity of 47 tons, but tests on "samples" of this larger size car, last summer, showed marked economy in time of unloading, fuel costs, and shortened trains with no added yardage required at the mine. Additional experiments will be run on this fifty-car order which may mean the replacing of the 8,000 cars now in use by those of the larger size. These cars will be delivered May 1 and will cost approximately $200,000.

Chief Consolidated Increases Capitalization Because of "Growing Business"

Creates 500,000 New Shares—Stockholders Given Subscription Privilege —Bonds Are Convertible

The Chief Consolidated Mining Co. of Eureka, Utah, is increasing its capitalization by 500,000 shares to 2,000,000, so as to create a reserve to meet the demands of its expanding business. As is well known, this company in recent years has largely increased its domain; and has just completed a milling plant, in which ores are treated by flotation and volatilization, the plan of the company being to treat both its own and custom ores. The plant is now in operation, and is making an important saving for the company. A good proportion of both base and precious metal is recovered in the treatment.

In regard to the stock, none of the new issue will be offered at less than $4.50 a share; and 166,000 shares are to be set aside to meet the convertible privileges of the $750,000 bond issue made at the time that construction of the mill began. Notice of the increase in stock has been sent to stockholders, who are offered the privilege of buying the new stock on the basis of one share. of new stock for every three shares of the old stock held. Such stock as is not taken up by stockholders will be held for use at some future time to meet the demands of the gradual development of the company's business in the future enlargement of the milling plant, or in acquiring the minority interests of the subsidiary companies owned by the Chief, or possibly in the development of some of the many properties owned by the parent company in the Tintic district.

Subscriptions from the shareholders should reach the company before Jan. 3, 1925. The directors in making the increase in capitalization say that they "are convinced that enough has been demonstrated to make it definitely evident that opportunity does exist for further expansion of the company's operations, with quite positive assurance of added profits."

Will Develop Cork-Province During Winter; Mill Down

The mill at the Cork-Province mine, at Zwicky, in the Ainsworth district of British Columbia, has been closed, on account of a shortage of water. The company has had a good season, 730 tons of silver-lead concentrate and 121 tons of zinc concentrate having been shipped to Trail since the mill was restarted in May last. Development of the mine will be continued through the winter, and any high-grade ore that is won in the work will be shipped.

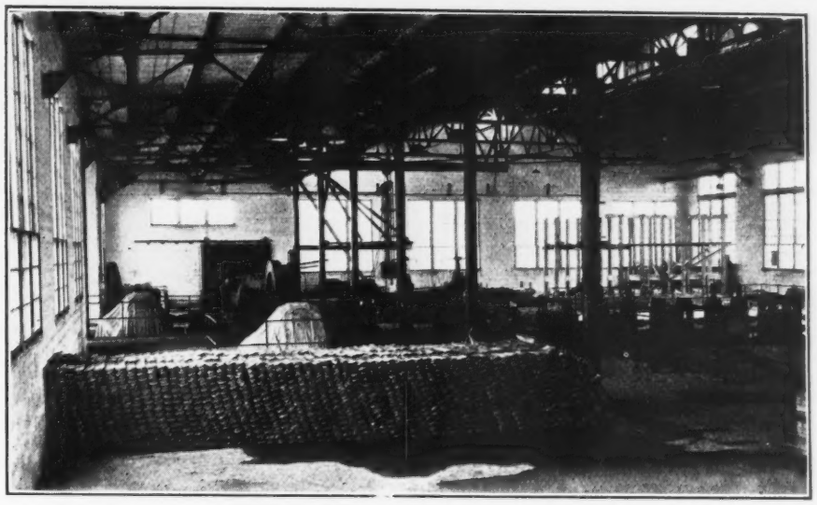
Trail Lead and Zinc Output Shows Big Increase

Up 50 and 70 per Cent Respectively Over 1923—Old Sport Copper Mine May Be Opened—Depends on Market

With the December production estimated, the output of the Trail smelter in British Columbia for the current year (1924) is 23,000 oz. of gold, 3,492,000 oz. of silver, 700 tons of copper, 75,000 tons of lead, and 27,000 tons of zinc. Besides this metal production at its smelter, the Consolidated Mining & Smelting Co. of Canada has shipped 44,000 tons of concentrate, containing 20,000 tons of zinc, to Antwerp, Belgium, and 5,800 tons, containing 2,700 tons of zinc, to Butte, Mont. The shipments to Belgium have been suspended, but those to Montana will be continued during December to an indefinite tonnage.

The lead and zinc outputs of the Consolidated company represent approximately the lead and zinc outputs of British Columbia, which, therefore, will show increases of approximately 50 and 70 per cent, respectively, over those of 1923. The capacity of the lead refinery is to be increased from 180 to 300 tons.

Should the improvement in the condition of the copper market continue, it is understood that the Consolidated company will give more consideration to this branch of the industry during the coming year. Officials of the company have been in conference with officials of the Canadian Pacific Ry. Co. with regard to the construction of a line from the Old Sport mine, on Quatsino Sound, to some point on the eastern shore of Vancouver Island. Such a line is necessary before the mine can be placed on a shipping basis. Another necessary work is the erection of a concentrator, as the ore is of too low a grade for direct smelting. Plans for a concentrator for this mine were made in 1920, but the slump in the copper market caused them to be pigeon-holed for the time being.



The copper-rod mill at the Trail plant

The Consolidated Mining & Smelting Co., which operates at Trail, in British Columbia, may increase its copper operations if prices continue to improve.

Resume Production at Laura Mine, on Mesabi Range

Operations at the Laura mine at Hibbing, Minn., which were suspended so as to make possible replacement of the headframe, were resumed on Dec. 5. Prospects are that 250 men will be on the payroll within the next ten days. This new headframe, which weighs twenty-six tons, was purchased for the new shaft recently sunk on the Laura property, but because of the distruction of the old headframe by fire last August, this temporary change was made. As soon as the new shaft is completed the headframe will be moved.

Graphic Lead Mine, in New Mexico, Proves Disappointment

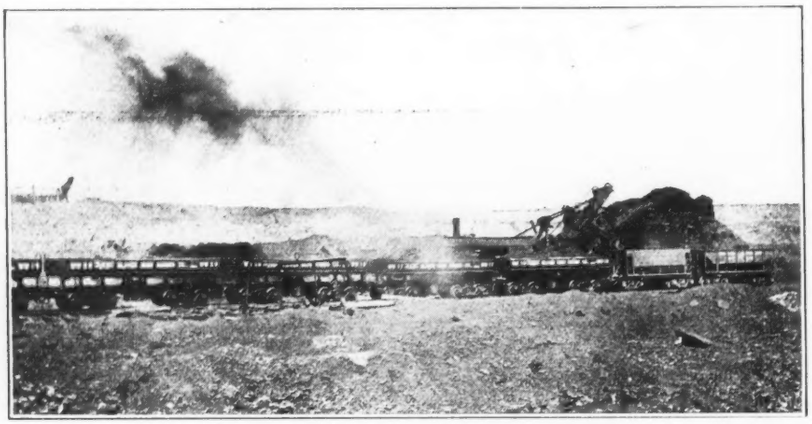
Sam Houghton and his associates have closed down all operations at both the mine and the new mill at the Graphic lead mine, four miles from Cooks Peak, N. M. The old 600-ft. shaft had been retimbered throughout. After an expensive retimbering and cleaning out of the mine, which has had a past production of over a million dollars, it was found that a fault had cut off the vein and the realization fell far short of expectations. Only one shipment of concentrates has been made from the new mill, which operated on the extensive old dumps which were thought to contain commercial values of lead.

Hanna Co. Moves Electric Shovel to Buhl for Stripping

Work of dismantling the model 225-B Bucyrus electric shovel used as a dragline for stripping the LaRue mine of the M. A. Hanna Co., at Nashwauk, Minn., is under way. This machine will be shipped to Buhl and used as a dragline in stripping the Shiras mine, formerly operated as an underground by the Oliver company, but now taken over by the Hanna Co. The Shiras adjoins the Wabigon mine on the east, and the two mines will be combined into one pit, the only pit on the range completely electrified.

The Virginia, Minn., office of the Hanna company has been closed, and the Mesabi district operations are now being conducted from the Hibbing office. F. H. Cohoe is the district superintendent for the Mesabi and A. J. Sullivan the chief engineer. The company has closed the Hobart, Fay, and Brunt mines, in the Virginia field, two of them having exhausted their ore reserves.

The Michigan operations are now being carried on from Iron River, where George M. Cannon is in charge as superintendent. Russell B. Wortley is the chief engineer for the district.



Stripping scene near Hibbing, Minn.

During the winter when the lakes are frozen, open-cut operations on the iron ranges are confined to removing overburden from the ore.

Bell Says Keeley Is in Excellent Position

J. Mackintosh Bell, managing director of the Keeley mine, in the South Lorrain area of northern Ontario, who has just returned to Toronto from an inspection of the mine, strongly denies reports of an adverse character which have been circulated. He says that the mine is in ore on the ninth level, where it carries high-grade in three places.

More than 1,000 ft. from the Woods vein in a break under Little Beaver Lake, important ore has been found in three veins. This was encountered in a crosscut run toward the Keeley extension property. A 100-ft. winze is being sunk to cut the veins. On the Woods vein a winze put down 60 ft. below the eighth level is in good ore. "Not only," said Mr. Bell "is the mine earning its 24 per cent steadily at the present rate, but it is adding substantially to its reserves."

News from Washington

By PAUL WOOTON
Special Correspondent

Oddie Hopes to Continue Work of Senate Gold-Silver Commission

Reviews Accomplishments to Date—Data on Copper "First Comprehensive Record Ever Made"—Discusses Inflation

IN REMARKS before the Washington Chapter of the American Institute of Mining and Metallurgical Engineers last week, Senator Oddie, of Nevada, revealed that the Senate Commission of Gold and Silver Inquiry will soon seek legislative authority to continue its work during the next session of Congress. The Nevada Senator, who is the chairman of the commission, believes the Senate is thoroughly justified in continuing this effort in behalf of the country's gold and silver producers. In his address, he pointed out some of the accomplishments which the commission already has to its credit.

The commission was in part responsible for the conference of silver producers at Salt Lake City in August of last year. That conference resulted in the setting up of a permanent organization, known as the American Silver Producers' Association. He pointed out the need for co-operative effort within the industry to deal with its problems in an effective and businesslike way. The intricate problems involved in considering the advisability of setting up a silver export association, under the Webb-Pomerene Act, were cited as an example of the constructive work that the association is undertaking.

The commission has been able to secure from the producers of copper, lead and zinc, whose operations have an important bearing on gold and silver production, more complete statistical data than ever before have been furnished a government agency. The statistics on cost of production, investment, and yield in the non-ferrous metal-mining industry are now being compiled so as to show essential aggregates. The copper compilations, Senator Oddie stated in his address, are undergoing final analysis by the commission's specialists and will be forwarded to the industry soon, for determination as to how the the aggregates will be made public. He declared that this will be "the first comprehensive record of certain important items governing the non-ferrous metal-mining industry that ever has been made."

The commission will publish soon after the first of the year its Serial 6, which contains the text of testimony taken at hearings held in all of the principal mining camps in the Western states. The testimony brings out the best thought that could be secured from the men actually engaged in metal-mining operations.

The greater part of Senator Oddie's address was devoted to the foreign currency situation and exchange rates. Out of those situations, he pointed out, have grown many of the difficulties of the producers of gold and silver. In the course of that discussion, he made the point that inflation is a form of taxation which "falls unequally and with entire disregard of ability to bear taxes. When inflation is carried to extreme, some individuals have practically everything they own taken from them. What they lose does not go, in many cases, to the government. Speculators and others reap handsome fortunes at the expense of the industrious and provident class. . . . Silver and other forms of metallic money are replacing the paper currency in most countries to the satisfaction and convenience of the public. European countries are in much better condition than they were, even a year ago, and they are continuing to improve. Few countries, however, have perfected reforms of a permanent nature, and the general restoration of gold as the international money is still in the future. Until this restoration is consummated and currency units are tied together by a common metal, gold, exchange disturbances will continue."

Scranton Mine in Utah Will Be Auctioned

The property of the Scranton mine, in the northern part of the Tintic mining district, Utah, was sold at Sheriff's sale at the Tooele County court house on Dec. 18. This followed an action brought against the company by Salt Lake City banks to collect an indebtedness said to amount to about $22,000.

The ore has been chiefly zinc, with lead ore in places, mined from workings which did not reach great depth. It is probable that there is still ore left in the Scranton, and also that with systematic development new deposits could be opened.

Bureau of Mines Curtails Work As Economy Measure

Superfluous Offices Closed—Ore-dressing Work Transferred to Salt Lake Station in Utah

To comply with the demand for reduced expenditures by the Federal Government, the Bureau of Mines cites the following concrete instances in a report to the Appropriations Committee of the House:

1. "The field station at Ithaca, N. Y., devoted to studies of alloys, and which had accomplished work on steels and brasses of direct importance to the Army, Navy, and industry, has been abolished along with the section at Pittsburgh engaged in similar work on aluminum. Instead the minimum of work absolutely necessary in this field is being accomplished by transfer of funds to the Bureau of Standards and the stationing in Standard's laboratory of a liaison metallurgist of the bureau.

2. "The work on fundamentals of processes conducted at the Massachusetts Institute of Technology in cooperation with the milling committee of the American Institute of Mining Engineers has been abandoned and in its place the absolute minimum of the projected program is being carried out at the Salt Lake station of the bureau.

3. "The Shreveport (La.) office of the oil-leasing work has been abandoned and that district is covered from the Dallas (Tex.) office. This results in saving of rent and clerk hire at the expense of slightly increased travel, but with a net gain.

4. "The St. Louis office has been closed. While this makes no saving in rent, since the chamber of commerce furnished the office, it releases a clerk and makes minor savings.

5. "The supervising mining engineer at Duluth has been withdrawn and the most necessary part of his duties transferred to a resident engineer, who serves coincidently as car engineer. At the same time the office space was reduced with a saving in rent.

6. "The coal-washing work conducted for a number of years at Urbana, Ill., has been stopped, and the staff there is now, in effect, that of a resident engineer rather than a full station as contemplated by the law of March 3, 1915. This is regarded as a temporary measure pending ratification or the reverse by Congress, but meanwhile has released funds and personnel urgently required for other service.

7. "The Fairbanks (Alaska) station, established under the terms of the act of March 3, 1915, and later by Congressional action consolidated with other Alaska work, has been closed. This action is, of course, subject to disavowal by Congress, to which it is here reported, but is in the interest of economy and efficiency and has the approval of the Fairbanks Chamber of Commerce. The testing equipment of the station has been transferred to the Alaska College of Agriculture and Mines, and that part of the personnel retained has been put on urgently needed field work. With the money saved by this consolidation it has been possible to equip and to man without special appropriation a simple but sufficient mine-rescue car."

Toronto Letter

By Our Special Correspondent for Northern Ontario

New Discoveries at Cobalt May Prove Very Important

High-Grade Silver Ore in Gillies Limit Area—Nipissing Has New Ore Near Cart Lake

Toronto, Dec. 14—During the last few weeks several new discoveries have been reported from the Cobalt district, which may be exceedingly important. The latest one is a discovery of high-grade ore near Bass Lake, in the Gillies Limit, about four miles from the town of Cobalt. Very little work has been done on the property, which is owned by the Hector Silver Mines, Ltd., as the discovery was concealed for a time until additional ground could be acquired. The vein has been traced for about 200 ft., and in the small test pit shows 2 in. of 1,000-oz. ore. This is the first discovery of high-grade ore in this particular section; as a matter of fact there is no producing mine in the Gillies Limit.

It is also reported that the Nipissing has made a discovery of high-grade ore near the shores of Cart Lake, near where arrangements are being made to sink a new shaft several hundred feet in depth.

A new discovery is also reported from the Colonial mine, which is controlled by the Continental company. This discovery, on the 1,000-ft. level, is at a considerable distance from the shaft. The Colonial is the newest producer in the Cobalt district. The government figures for the nine months ended Sept. 30 show a production of 339,461 oz., most of which was produced in the latter part of the period.

The Huronian Belt Co., which controls the Keeley, Vipond, and Canadian Lorrain, in the South Lorrain district, is bringing out another company called the "Keeley Extension Mines." Arrangements have been made with the Keeley for the driving of an exploration crosscut from the eighth level to the Keeley Extension ground. This work has already shown high-grade ore on the Keeley property not far from the Nipissing Extension, which is considered to be very important. During the month of November production from the Keeley was 126,244 oz. of silver. During the same month at the Canadian Lorrain property a short shoot of ore was discovered at the 350 level, and it is now proposed to explore the conglomerate which has been found underlying the diabase.

A report of the Arntfield Syndicate, operating in the Lake Fortune district of northwestern Quebec, states that trenching has disclosed a gold-bearing zone for a length of several thousand feet, as well as parallel veins, on which little work has been done. The result of drifting and diamond drilling has indicated a number of places where further work may prove shoots of payable ore. On the main zone six trenches show an average of $5.11 over a width of 17½ ft. for a length of 530 ft., and seven drill holes put down in this area indicate $4.81 over 6½ ft. for a length of 765 ft.

During November, production from the Vipond mine, of Porcupine, was $51,200 from 4,780 tons milled, or an average recovery of $10.70 a ton. New discoveries on the 1,000 level appear to be the downward extension of the main veins of the old Vipond property and apparently are of some importance.

Wright-Hargreaves directors have declared the usual dividend of 2½ per cent payable Jan. 1 next to shareholders of record Dec. 15, together with an extra bonus of 2½ per cent payable on the same date.

Joplin-Miami Operators See Stable Production Rate, but Higher Prices

PRODUCERS in the Joplin-Miami district are confident of $50 a ton for zinc "ore" before the first of the year, and believe such a price will be maintained, on the average, for a good part of 1925. The basis for their belief rests in steadily growing demand for their product, with production held down by various depletions and closing down of mines and with others in the hands of owners who believe in "sane" production. Even if ore prices should mount to $55 a ton it is considered doubtful whether output would materially increase over what it is at present.

Surveys by the Tri-State Zinc and Lead Ore Producers' Association, reported on Dec. 10, showed that surplus stocks of zinc concentrates in this field, unsold, amount to only about 13,800 tons, or less than one week's supply for the smelters. A few months ago unsold stocks in bins amounted to 40,000 tons. Production now is about 15,200 tons a week, and 154 mills were operating on Dec. 11.

Increase Lead-Ore Shipments From Metaline Falls

Increased activity in the Metaline district, in Washington, is due to the high price of lead. The Bella May property has been sold under a bond and lease for $130,000. The owners have shipped over 700 tons of hand-picked lead ore in the last ten months, and have four more carloads ready to ship.

The Broadway is under a bond and lease for $60,000. The company is installing machinery now and expects to be shipping soon. The Old Grand View property is leased, and very high-grade ore has been shipped.

The Marning & Mammoth was bought at tax title, and the purchasers expect to start work on it at once.

Mexico City Letter

By W. L. Vail
Special Correspondent

Optimism Prevails in Mining Industry as Year Ends

Settlement of Tax Questions Will Go Over Till Calles Officials Are Inducted

Mexico City, Dec. 2 — The mining industry in general takes rather an optimistic turn at the beginning of December. Silver miners are especially satisfied with the prices. The Peñoles company is shipping regularly every month about ten tons of refined silver to Germany, and other important companies are exporting bullion to Europe in considerable quantities. The American Smelting & Refining Co. is spending large sums at Rosita, in Coahuila, and at San Luis Potosi, where the new 20,000-ton copper smelter is nearing completion.

The mining companies are still left guessing regarding the classification of metallurgical plants for the purposes of taxation; and also the method for getting at the exact income tax on mine products under the new law. The Mining Chamber of this city has had several sessions with officials of the Treasury Department, without, as yet, definite results. As there will probably be considerable reorganization in department staffs under the Calles régime, most of these vexing problems will presumably lay on the table for the time being.

The 920,000 peso loan arranged by some of the mining companies last August has been abrogated, and the first advance returned to the companies because of a misunderstanding between them and the Monetary Commission which was to handle and guarantee repayment of the loan. One of the conditions of the advance was cancellation on the part of the government of the 25 per cent export tax on silver ores. There is doubt as to whether or not the tax will be assessed again.

The Mining Chamber has entered a protest against the recent decree of the Treasury Department ordering production taxes paid into a special department created for that purpose, instead of at the mint, as was heretofore the custom. The objection is based on the fact that many of the concerns are in the interior, where no branch service is obtainable, and the decree therefore causes hardship and increased expense. The mint has authorized agencies for the receiving of payments in all mining centers.

A commission headed by Messrs. A. A. Chaplin and M. Nivette, of the Central Mining School of Paris, has arrived in the interest of the Vieilla-Montagne zinc syndicate, with headquarters near Liége, Belgium. It is reported that the syndicate has options on the zinc plant recently established at Saltillo, Coahuila, and a number of zinc properties in the states of Coahuila, Chihuahua, and Durango. The experts are supposed to advise on the advantages of making heavy investments in Mexico. The Vieille-Montagne people have large plants now in France, Holland, and Spain, aside from the home establishment in Belgium.

Concession has been extended for the construction of a new railway from Chihuahua city to Hermosillo, capital of the State of Sonora. The principal object is to tap a large undeveloped mineral district and furnish transportation for a number of camps in that section now working under serious disadvantages.

The Oriental Mining Co., with a capital of $3,000,000, has been organized to operate in the Pachuca camp, State of Hidalgo. The Perigrinos and Argentine properties have already been secured and a plant of 80-ton daily capacity is under construction.

Arizona Pyrite Brings $1,344 per Ton for Radio

ED. HILL AND R. E. CULVER, operating the Gold Medal mine, near Poland Junction, upper Big Bug Creek, Arizona, are filling an order received from an eastern manufacturing concern calling for seven tons of pyrite, to be used in the manufacture of radio parts They receive $1,344 per ton, or 60c. per pound, for the crystals.

No. 2 washing plant of the Paga Mining Co., important producer of barytes at Cartersville, Ga.

London Letter

By W. A. Doman
Special Correspondent

Bwana M'Kubwa Has 7,567,000 Tons of 3.9 per Cent Ore

Another African Copper "Menace" Looms—Metallurgical Plant in Course of Construction

London, Dec. 2 — In the matter of ore reserves Bwana M'Kubwa mine, in Rhodesia, shows up remarkably well. The annual report of the directors, just issued gives an estimate of 7,567,000 tons, averaging 3.9 per cent copper. This quantity is down to the 350 ft. level, and as 3,500,000 tons is above the 270 ft. level, it will be seen that values are not only maintained but slightly improved upon in the lower horizon. The company has been in existence since 1910, but like the San Francisco Mines of Mexico, the ore was too complex to be treated profitably by any known process. Minerals Separation has now devised a process, and has treated representative tonnages of ore from various points in the mine, giving recoveries at more than 92 per cent, the refined metal assaying 99.85 per cent of copper. This is regarded as satisfactory. Development at Bwana is now suspended, and work is being concentrated on preparing the mine for production on a basis of 1,000 tons of ore a day. The necessary material for the plant has been ordered and construction generally is in progress. At the N'Kana mine nothing is at present being done, but prospecting is being carried out on various areas in the mining Concession.

Considerable discussion is taking place here in connection with the Davidson mine, in Canada, offered to the British public in 1922 by the Porcupine Davidson Gold Mines, Ltd. The trouble is in connection with the reports of the experts. On flotation, favorable views were expressed by Messrs. F. Loring and G. Bent, amplified by Rowland Feilding. From the documents it appears that the reserves, proved and probable, totaled 350,000 tons, with an extractable value of $11 per ton, or in sterling about £1,000,000. Rumors subsequently were put into circulation here that something was wrong with the mine, and R. P. H. Bullen, well known on the Kolar field, was sent from London to make an examination. He has made an adverse report on the property. In his investigation he was assisted by H. A. Kee, the manager of the Kerr Lake mine. Neither of these engineers can find the tonnage or values stated. Mr. Bullen suggests that the remaining funds could be used more profitably elsewhere, but Mr. Kee advises further testing work. Such a state of affairs is disturbing, as the differences of opinion are so great, and all the engineers are men of reputation. Mr. Bullen criticises working expenses, which were put at $4 per ton, and he points out that the Hollinger, Dome, and McIntyre—all established mines—in 1923 worked at a higher level of cost. Apparently no official explanation can be given yet, as legal proceedings are said to be pending.

Men You Should Know About

Arthur Thacher, consulting mining engineer, is in New York City.

O. L. Ketterbach is expected at Berkeley, Calif., from the Philippine Islands.

J. Edgar Pew, of Dallas, Tex., has been elected president of the American Petroleum Institute.

E. M. Hamilton, metallurgical engineer of San Francisco, is at Jackson, Calif., on professional business.

Maurice W. Summerhayes has been appointed consulting engineer and general supervisor of work on the property of the Kirkland Rand at Kirkland Lake, Ont.

R. C. Coffey has resigned his position as manager of the Lake Shore mine, Kirkland Lake. Harry Oakes, the president, is temporarily in charge of operations.

S. R. Capps has been designated as acting chief of the Alaskan division of the U. S. Geological Survey to fill the vacancy created by the death of A. H. Brooks.

Courtenay De Kalb will deliver the course of Horizon lectures (Guy Morrison Walker foundation) at De Pauw University in January. The topic will be "Dynamic Nationalism."

Philip D. Wilson, chief geologist of the Calumet & Arizona Mining Co., will leave the United States around the first of the year on an extended visit to the South American republics.

J. P. Caulfield, who had been connected with the United Comstock Mines Co. at Gold Hill, Nev., as superintendent of mines for the last two years, has resigned and is now in Reno, Nev.

O. H. Fairchild, of Chicago, arrived in Seattle, Wash., recently on his return from Japan, where he had spent nine months erecting a 2,000-bbl. oil cracking plant for the Nippon Oil Co., of Tokyo.

Charles McCrea, Minister of Mines for Ontario, in an address to the Empire Club of Toronto on Dec. 11 estimated the output of the mines of the Province for 1924 at between $74,000,000 and $75,000,000.

A. E. Flynn, professor of mining at the Nova Scotia Technical College, Halifax, has been engaged by the Advisory Research Council, Ottawa, to investigate the treatment of Nova Scotia oil shales.

T. F. Sutherland, Chief Inspector of Mines for Ontario, has returned from a visit to the mining districts of northwestern Quebec. He says that at least one thousand square miles of territory has been staked out by prospectors.

Frederic A. Delano, of Washington, D. C., federal receiver for the disputed Red River oil land area between Texas and Oklahoma, was in Wichita Falls, Tex., recently for the purpose of settling all claims of oil producers and royalty owners.

John A. Dresser, of Montreal, has been engaged to make a complete examination and valuation of the Bingo gold mine in the Herb Lake area of northern Manitoba, recent sampling having failed to confirm the values previously reported.

C. Leonard Ball, formerly managing director of the Cia. Huanchaca de Bolivia, has returned from Europe and is spending several months in New York City. Mr. Ball will sail for South America on Jan. 2, to assume his new duties as Director General of the Mining Department of Bolivia.

Alberto Terrones Benitez, correspondent for *Mining Journal-Press* for several years in the State of Durango, Mexico, was during the last political campaign in that country elected to the

Senator Alberto Terrones Benitez

Mexican House of Representatives for the Sixth Durango District, on the Calles ticket. While in the House of Representatives he was called to the Senate to take the place of General Enrique R. Nagera, Governor-elect of the State of Durango. Senator Terrones will remain in the Senate until Aug. 31, 1926, upon permission of the House of Representatives.

James Hopkins, Colorado mining engineer, recently with the Tonopah Mining Co. at Idaho Springs, Colo., will open offices as a consulting mining engineer in Denver. Mr. Hopkins was recently married to Miss Mary E. White, daughter of H. King White, a former political and business leader of Arkansas.

Dr. Arthur Wade, the American geologist appointed by the Federal Government to investigate oil prospects in Australia, has presented his report to Parliament. He states that he has been unable to find any possibilities of oil in payable quantities in the northwest of Australia or in the Northern Territory.

J. S. Negru, formerly managing editor of *Chemical and Metallurgical Engineering,* and now editor in chief of the *Revue Universelle des Mines,* of Liége, Belgium, who had been in the United States for some weeks, recently departed for France and Belgium to study the mining industries there, and especially the most pressing needs for raw materials—particularly zinc ores.

William H. Bassett, metallurgist of the American Brass Co., Waterbury, Conn., has been awarded the James Douglas gold medal. The medal, commemorating Dr. James Douglas, twice president of the Institute, is bestowed annually for distinguished achievement in non-ferrous metallurgy. It was established in 1922 by anonymous donors.

Walter C. Clark, chief electrical engineer of the Bunker Hill & Sullivan Mining & Concentrating Co., recently delivered several lectures to the students of the School of Mines and College of Engineering at the University of Idaho, dealing with mine equipment in the Coeur d'Alene district and particularly with the new a.c. electric hoist installed in the Bunker Hill mine.

W. V. DeCamp, general superintendent of the United Verde Copper Co., will give the first of a series of lectures that have been arranged for the engineering students of the University of Arizona during the coming winter. Twelve of the leading engineers, geologists and mine executives of Arizona have consented to talk to the students during the present year on their particular field of work.

Stephen L. Kaffer has been appointed superintendent of milling operations for Cia. Minera Explotadora de Promontorio, S. A., operating the old Promontorio property in Durango, Mexico. The Promontorio company, controlled by Eastern capital, plans unwatering the mines, installing an oil-burning power plant, erecting a new mill, and placing all operations on a modern basis. Mailing address is Estacion Chinacates, Dgo., Mexico.

Andrew Gibb Maitland, chief government geologist of Western Australia, has been awarded the Mueller memorial medal for eminent services in the cause of geology in that state and in Queensland and New Guinea. For several years Mr. Maitland worked under the late Dr. R. L. Jack in Queensland, where he made a survey of all the artesian beds of that Australian state. He was the pioneer of geology in Western Australia, the geological survey of which he made.

Sporting Events

John Sully, manager of the Chino Copper Co., at Santa Rita, while hunting in the Black Range, in New Mexico, killed a black-tail buck of unusually great weight and size.

Alford Roos and party, who were also hunting in the Black Range region, in addition to a full bag of blacktail and whitetail buck and wild turkey, had unusually good luck shooting wild pig, which next to bear are the most wary and cunning of big game found in New Mexico.

D. C. Jackling and party have returned from their annual deer, bear, and turkey hunt in the Black Range, New Mexico. They hunted in the Saupello River country this season, and got all the law would allow, of all classes of game. Fine warm, sunny weather prevailed during the entire New Mexican hunting season, this year.

Societies, Addresses, and Reports

Business of Mining Considered at Los Angeles

Seeley W. Mudd Discusses the Personal Element as an Important Factor in the Work of a Mining Engineer

SPEAKING at a meeting of the Southern California section of the A.I.M.E. at Los Angeles on Dec. 2, the success of which was due in large measure to the initiative of Rush T. Sill, chairman, Colonel Seeley W. Mudd emphasized the importance of the personal element in the work of the mining engineer. Attention was drawn to the Rogers resolution, recently considered by the Mining and Metallurgical Society of America, by which underwriting houses that are advertising mining securities for sale were urged to place more reliance on the reports of engineers not directly interested in the welfare of the venture. Colonel Mudd averred, however, that there were two sides to this question: Many a statement made by the president or consulting engineer of a company, in regard to the performance and prospects of that company, was wellnigh ideal in accuracy, scope, and clarity. An evaluation from such a source is usually more comprehensive and more valuable than is the report of an independent engineer, who may have spent no more than a few weeks on the property. The importance of a thorough appreciation of local conditions cannot be overestimated, although this aspect of the matter is seldom realized by the engineer on a hurried inspection trip. The following example was quoted by Colonel Mudd in order to strengthen this contention.

Ten years or so ago two properties, to be referred to as A and B, respectively, were consolidated as the result of a report by an independent engineer. Opinions were also obtained from two other engineers of local standing; all three, however, ranked high in experience and integrity. The outside engineer maintained that property A was worth twice as much as property B, and negotiations were completed with this conclusion as a basis. One of the local engineers, who had managed one of the properties, was of the opposite opinion, and in this he was supported by the third engineer. Both agreed that property B was worth more than property A, a verdict justified by subsequent history, as measured by dividend returns. A court order enjoining the separate operation of the two properties has since made possible the comparison of output and profit, whereby a valuable lesson is available as to the importance of paying adequate attention to a local estimate of present and future value.

Mining Legitimate Business If Risk Be Spread

The public, Colonel Mudd maintained, should be in a position to judge, by information supplied, the intrinsic value of any mining enterprise. Pope Yeatman and Herbert Hoover were quoted in support of this viewpoint. The report of a reliable engineer should be available as influencing evidence; and judgment as to the soundness of the enterprise should be based, moreover, by a consideration of the standing of the banking house concerned, and the personal and professional reputation of the gentlemen comprising the board of directors and the management of the company.

Mining is often referred to as a gamble; but if the operations are conducted with care, method and patience, the outcome may be anticipated with a degree of certainty, even in the most uncertain phases of the work. Life insurance is a safe business, because of the spread of risk; but if it were based on the expectation of one life it would be a gamble. Similarly, mining involves financial hazard only when one oil lease or one prospect is under consideration. When a company with good management, careful geologic and technical guidance, and adequate capital embarks on an enterprise by which it controls several properties, the venture becomes legitimate business, with the probability of making larger profits in proportion to capital invested than is possible with the majority of other business undertakings.

The Risk Should Be Clearly Understood

The fundamental requirements in mining include a clear understanding of what is being done and proposed, the risks to be anticipated and the value of good judgment. An organization, said Colonel Mudd, is often spoken of as the length and shadow of a man. Similarly, the mining industry is judged by the character of the men associated with it. Over 400 years ago Agricola said: "They even state miners exist wholly by fraud, deceit and lies. By exposing such frauds our critics suppose all good opinion of miners is lost. Is the wickedness of one or two to brand the many honest with fraud and trickery?" The unscrupulous promotor will always be with us, seeking fresh opportunity to deceive. So long as mining offers this opportunity, he will favor mining as a means to an end. The task before the profession is to make it more difficult for such an individual to impose on the public thus—to educate the public to the importance of full and complete information from sources of unquestioned reliability. When this is achieved, mining will cease to attract the rascal as a profitable field for unscrupulous operation.

Co-operation between bankers, brokers, and engineers is essential, each working within his own province, whereby complete trust is established. Such trust, however, is often conspicuous by its absence. In Los Angeles, for instance, it is difficult to be generous in confidences toward strangers, of whom an increasing number come daily to swell the ranks of population in so new and rapidly growing a city. "I never look into the faces of such a group as this," said Colonel Mudd, "without a feeling of keen regret that I do not know you all more intimately."

How to Help Small Mines

The middle class is often referred to as the backbone of any nation. How can a multitude of small mines be made the backbone of the mining industry? Great mines need no help. The small property, however, is in equal need of expert technical guidance, so that it can be encouraged if promising and abandoned if hopeless. The large exploratory companies, on account of scattered operations, costly personnel, complex organization, and reluctance or inability to delegate final authority, find the prospecting, early development, and even the operation of small mines difficult, expensive, and generally unprofitable. High executives are smothered with problems relating to small matters. The result is that attention is deflected toward the opportunity that promises the largest reward. The problem of the development of the small property is still unsolved, Colonel Mudd stated.

When a mining enterprise is conducted with the economy, care, good judgment, technical and business ability, and financial support given to other ventures, the results are satisfactory. With the public, however, the attitude is too common that such success is due to luck rather than to pluck, aided by an understanding of the problem as a result of a thorough analysis, logical conclusions, and sound policies. The best safeguard for the mining industry is a clear appreciation of facts, and a fearless facing of all that are of an unfavorable aspect.

Mining Engineers "Cold Nosed"

Mining engineers have been accused of being "cold nosed." There is some justification for this opinion. It would have been better if some mines now dormant had been given the benefit of the doubt by examining mining engineers. A distinguished surgeon once remarked that "If the dead in the graveyards had voices, they would raise them in a plea for more education, more science and more thorough and fundamental understanding of problems." Similarly, many abandoned mills, idle mines and destitute camps, if they had voices, would cry for more searching investigation, for more adequate financing, more efficient management, and a better understanding of real conditions. Concluding, Colonel Mudd, made an appeal to engineers to forget personal and professional advantages and to sound a note of "practical idealism," counting only the outcome of the undertaking and the benefit to the investor.

The meeting was preceded by a dinner, attended by over one hundred members and guests. Addresses were also given by Rush T. Sill; F. H. Pettingell, president of the Los Angeles Stock Exchange; and V. H. Rossetti, of the Farmers and Merchants National Bank.

Recent Technical Publications

Reviews, Abstracts, and References

Contributions to the Geology of the Mesabi Range. By John W. Gruner, Bull. No. 19, Minnesota Geological Survey, Minneapolis.

This bulletin has special reference to the magnetites of the iron-bearing formation west of Mesabi, but is a valuable and concise summary of the whole problem of the Mesabi iron range. The illustrations are an important addition to the text. The "conclusions" as to the origin of the ore, on page 63, form a clear-cut and balanced summary. Among the numerous contributions to the geology of the Mesabi range, this bulletin will be found to assay relatively high to the ton.

J. E. SPURR.

Mexican Year Book, 1922-1924. By Robert G. Cleland, Los Angeles, Calif.

This is the second edition of a book published about two years ago. Considerably more space is given to statistical and other matter of a current nature than to descriptions of Mexican institutions, as was done in the first edition. A 50-page section is devoted to mining, including a list of the operating mines of the country prepared by the American Chamber of Commerce of Mexico in 1923. Many of the legal enactments of the country are given in the appendix, together with a gazetteer. The book is probably the best general reference work available to those who carry on business or travel in the territory of our Southern neighbor.

Annual Report of the Smithsonian Institution. 1922. Obtainable from the Smithsonian Institution, Washington, D. C., or for $1.50 from the Superintendent of Documents, Washington, D. C.

In addition to the report proper, this book contains an appendix with many papers of general scientific interest. Among the subjects of most appeal to our readers are the following: "Recent Discoveries and Theories Relating to the Structure of Matter," 12 pages, by K. T. Compton; "The Architecture of Atoms and a Universe Built of Atoms," 10 pages, by C. G. Abbot; "The Age of the Earth," 34 pages, by T. C. Chamberlin and others; and "How Deep Is the Ocean?" 10 pages, by C. G. Abbot.

Oil Refinery Specifications. By A. L. Nugey. Published by the Chemical Publishing Co., Easton, Pa. Price $3.50.

This book is a condensed discussion of the proper materials to be used in the construction of petroleum refining plants and filling stations. Much of the constructional data will be found useful also to engineers engaged in other constructional work.

Fireproof Construction—A pamphlet of 24 pages, one on "Comparison of Types of Fireproof Construction," by Chester L. Post, and the other an "Analysis of Cost of Types of Fireproof Construction," by Arthur F. Klein, has been reprinted for free distribution by the Portland Cement Association, Chicago, from the *Journal* of the Western Society of Engineers.

Metallurgy of Gold—"Protective Alkalinity, and the Use of Alkali in Cyanidation," by J. R. H. Robertson, is the subject of an 18-page paper in the *Bulletin* of the Institution of Mining and Metallurgy for November. The author discusses practical work that he has carried on in various parts of the world. Extra copies of the paper may be obtained for 1s. 6d. from the offices of the Institution, Cleveland House, 225, City Road, London, E. C. 1, England. In the same issue of the *Bulletin* is a paper of 40 pages by R. H. Kendall and A. F. Hosking on the "Treatment of the Gold-Bearing Quartz of the Kolar Gold Field," with accompanying discussion. This covers the practice at the Mysore, Champion Reef, Oregum, Nundydroog, and Balaghat milling plants both as regards the treatment of current ore and accumulated tailings. Of particular note is the use of manganiferous limestone in the cyanide process. Before calcining, the material averages 29 per cent CaO; 27 per cent CO_2; 16 per cent Mn; and 14 per cent SiO_2; the analysis suggesting dialogite or rhodochrosite. The calcined material is not only an alkaline reagent but also an oxidizer, and its use in the treatment of old dump material greatly increases the solvent action of the cyanide, makes more base metals dissolve than formerly, and causes a larger quantity of copper to be precipitated with the gold in the zinc boxes.

Alaskan Mining—The annual report of the Mine Inspector of Alaska for 1923, 109 pages, has recently been published and is obtainable from B. D. Stewart, Mine Inspector, Juneau, Alaska, on request. It describes new equipment at the various mines and outlines the work done during the year.

Thawing Frozen Pipes—Bulletin No. 7, Engineering Extension Service, Lafayette, Ind., is a 16-page paper by D. D. Ewing and C. F. Bowman on "Thawing Frozen Water Pipes With Electric Current." Much valuable practical information is given, as a result of tests carried on at Purdue University.

Lead Ore Roasting—The *Proceedings* of the Australasian Institute of Mining and Metallurgy, Melbourne, for June 30, 1924, contains a 27-page paper by G. Lindesay Clark covering "Investigations on Lead Roasting at the Sulphide Corporation's Works at Cockle Creek, N. S. W." The first part of the paper discusses experimental work on Godfrey furnaces and Huntington-Heberlein pots, and the second part is an account of experiments on the utilization of the hood gases from the H.-H. pots for acid making.

French Metal Market—The Dec. 1 issue of *Commerce Reports*, published by the U. S. Department of Commerce, and sold for 10c. by the Superintendent of Documents, Washington, D. C., contains a three-page article by R. M. Santmyers on "France as a Market for American Metals."

U. S. Mint Report—The annual report of the Director of the Mint for 1924 has recently been published, 237 pages, obtainable free of charge from the U. S. Treasury Department, Washington, D. C. As customary, it gives a great deal of information about the production and consumption of precious metals throughout the world, and the coinage of various countries.

German Phosphate— *Metall und Erz* for Nov. 1 (Wilhelm Knapp, Muhlweg 19, Halle (Saale), Germany; price 1.2 marks) contains an illustrated article of seven pages on "Die Technik des Deutschen Phosphatbergbaues."

Electrolytic Zinc—In the same issue of *Metall und Erz* mentioned just above, is a six-page article by M. v. Schwarz on "Untersuchungen uber Elektrolytzink."

South African Mining—The annual reports of the Secretary for Mines and Industries and the Government Mining Engineer for 1923 are now obtainable for 10s. 6d. from the Government Mining Engineer, P. O. Box 1132, Johannesburg, South Africa.

Patents

Mine Shovel—Reissue No. 15,950. Nov. 18, 1924. R. S. Butler, Joplin, Mo. A type of mechanical shovel for use in mines, with moving parts actuated by pistons.

Smelting — No. 1,515,906. Nov. 18, 1924. J. R. Steel, San Francisco. A method of smelting ore by heat from the combustion of a hydrocarbon fuel and oxygen gas. Patent No. 1,515,907 to the same applicant covers the same process with the addition that the smelted ore is subjected to a reducing agent.

Zinc Smelting—No. 1,516,423. Nov. 18, 1924. L. H. Diehl, Darmstadt, Germany. Ore or slag containing iron and zinc is smelted in the presence of a chloride, lime, and coke, but not sufficient to yield iron as a product. The zinkiferous fume is collected. Patent No. 1,517,232. Nov. 25, to the same applicant, covers the treatment of zinc-iron sulphide ores by roasting, smelting in a blast furnace in the presence of a chloride and suitable fluxes, tapping off the molten iron produced, and collecting the zinkiferous fume.

Reducing Furnace—No. 1,516,934. Nov. 25, 1924. E. B. Thornhill, Hurley, N. M. A heating furnace, containing a retort through which metalliferous particles are showered in the presence of a reducing agent. The furnace is presumably used in connection with the production of sponge iron.

Leaching—No. 1,516,356. Nov. 18, 1924. T. J. Taplin, Jr., London, England, assignor to Metals Production Co. of North America, Inc., New York City. In leaching ore containing slime mixed with coarse material, the slime is first separated and leached by suspending it in a large proportion of the total leaching liquor required for the process, the same leaching liquor being subsequently used for leaching the coarser material.

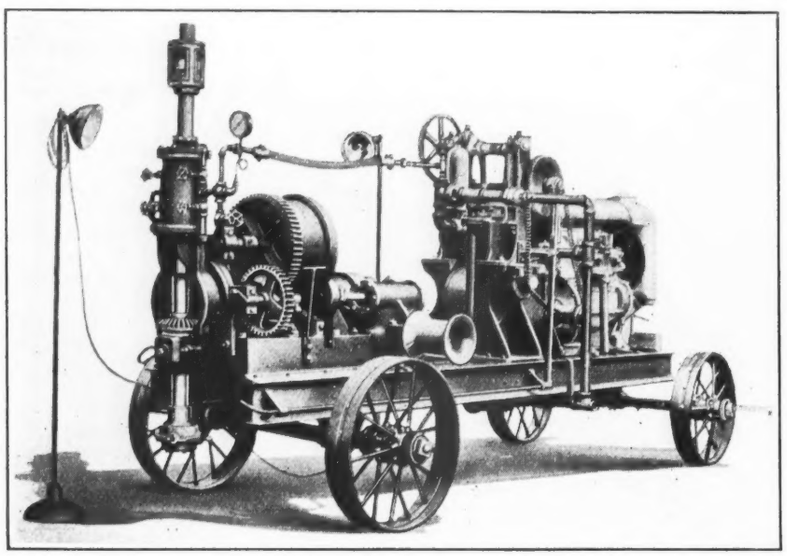
Concentrating Plate—No. 1,516,640. Nov. 25, 1924. C. M. Meyer, Los Angeles. Design of grooves and bridges for a stationary concentrating plate.

New Machinery and Inventions

New Gasoline Diamond Drill Introduced

The E. J. Longyear Manufacturing Co., of Minneapolis, Minn., has recently placed on the market a gasoline-driven diamond drill that has attained favor and promises to give a new impetus to diamond drilling. The Ford Motor Co., which is using drills of a similar design for lead exploration in Missouri, is to be given credit for a large number of the ideas in the design, it is stated.

The principal features claimed for this machine are its portability, flexibility, and standardization. The entire unit, consisting of a Longyear No. 2 N diamond drill, a Fordson gasoline motor, and a Goulds triplex pump, is



This diamond drill unit includes, besides the drill, a gasoline motor and a triplex pump. It is equipped either with steel wheels or caterpillar tread

mounted on a substantial steel truck either with steel wheels, as shown in the illustration, or with caterpillar tread for heavy ground. Drill, motor, and pump are of standard makes and sizes, thus affording the minimum of delays due to waiting for repair parts.

The motor is controlled by a governor which automatically increases the power under load. Three transmission speeds and independent clutches on drill, motor, and pumps are all readily controlled by levers within immediate reach of the operator. The amount of water delivered by the pump is controlled by a by-pass, with a relief valve to protect the pump against sudden high pressures. This gives perfect control over the circulation of water and at the same time relieves all strain on the chain at the crank shaft and on the connecting rods of the pump.

The drill is the standard No. 2N drill made by the company with a capacity of 1,000 ft. of 2-in. core or 2,000 ft. of 1¼-in. core. In addition to the internal geared hoist, it is equipped with a spool hoist, or cathead, for driving standpipe. Either 12-in. or 24-in. hydraulic feed can be furnished. An electric generator with three electric lights makes efficient night work possible.

This Steam Trap for Extreme Pressure

A new steam trap designed for extreme pressure and temperature has recently been introduced by the Armstrong Machine Works, Three Rivers, Mich. In this the body and cap are of the highest grade of cast steel, having the following characteristics: Tensile strength approximately 70,000 lb.; elongation 25 per cent; carbon 0.25 to 0.30; manganese 0.60; silicon 0.25 to 0.30. All strains are removed from the castings by annealing. This trap embodies the same patented basic operating principle that has been well established in the standard Armstrong trap. As in the standard trap, the discharge is at the top, so that oil and sediment are forced out whenever the trap discharges. An air port in the closed end of the inverted submerged bucket permits any air that may enter the trap to rise to the top and be released when the trap discharges.

Realizing the difficult service conditions imposed by high pressure and superheat, the valve parts have been made particularly rugged, and throughout the trap is designed to operate efficiently under the most severe conditions. The valve parts are of noncorrosive chrome steel, machined from bar stock, then heat treated. The valves are furnished with orifices suitable for pressures up to 500 and 600 lb., or higher in special cases. The cap is bolted to the body with eight to ten large bolts, depending on the size of the trap.

After the trap is completed, it is hydraulically tested to pressures up to 3,000 lb., to insure tightness of castings, joints, and valves. The steel body trap is also made for pulsating pressure service.

A steam trap of steel designed for high pressure and temperature

Trade Catalogs

Alloy Steels—"Agathon Alloy Steels" is the title of a 48-page booklet recently issued by the Central Steel Co., of Massillon, Ohio, in which the various alloy steels produced by the company are described. The book is well illustrated and contains numerous tables and data of interest to metallurgists and engineers.

Hoists—The Shepard Electric Crane & Hoist Co., Hontour Falls, N. Y., has issued a 60-page illustrated descriptive price list and catalog covering its floor-operated electric hoists. Much information of use to prospective purchasers is included. Each type of floor-operated hoist made by the company is described. Photographs of installations are included, with clearance drawings and dimensions. Complete information regarding capacities, heights of lift, and other related subjects are given. A copy will be sent free on request.

Brake Lining—A 4-page folder issued by the Manhattan Rubber Manufacturing Co., of Passaic, N. J., describes Hycoe brake lining for hoisting engines, cranes, and friction clutches.

Shovels—Numerous installations of Thew shovels are illustrated in a folder issued by the Thew Shovel Co., Lorain, Ohio. Several letters from users testifying to the service given by their shovels are reproduced.

Tank Decks—Floating tank decks designed to prevent oil tank fires and evaporation are described in a 22-page pamphlet recently received from the Columbia Steel Tank Co., of Kansas City, Mo. The construction of this deck will be described in an early issue of *Mining Journal-Press*.

Belting—Two handbooks covering the use of Condor belt and conveyor and bucket elevator belts respectively have been received from the Manhattan Rubber Manufacturing Co., of Passaic, N. J. These books are intended to act as reminders to the operator.

The Market Report

Daily Prices of Metals

Dec.	Copper N. Y. net refinery	Tin		Lead		Zinc
	Electrolytic	99 Per Cent	Straits	N. Y.	St. L.	St. L.
11	14.00@14.125	54.375	54.875	9.025	8.75@9.35	7.15@7.175
12	14.075@14.125	54.75	55.25	9.025	8.75@9.35	7.25@7.325
13	14.125	54.75	55.25	9.025	9.35	7.40
15	14.125@14.25	55.00	55.50	9.30	9.00@9.75	7.50@7.55
16	14.25@14.375	55.375	55.875	9.30	9.00@9.65	7.475@7.55
17	14.375	55.25	55.75	9.30	9.00@9.65	7.45
Av.	14.194	54.917	55.417	9.163	9.246	7.390

These prices correspond to the following quotations for copper delivered: Dec. 11th, 14.25@14.375c.; 12th, 14.325@14.375c.; 13th, 14.375c.; 15th, 14.375c@14.50c.; 16th, 14.50c@14.625c.; 17th, 14.625c.

The above quotations are our appraisal of the average of the major markets based generally on sales as made and reported by producers and agencies, and represent to the best of our judgment the prevailing values of the metals for deliveries constituting the major markets, reduced to the basis of New York cash, except where St. Louis is the normal basing point, or as otherwise noted. All prices are in cents per pound. Copper is commonly sold "delivered," which means that the seller pays the freight from the refinery to the buyer's destination.

Quotations for copper are for ordinary forms of wire bars, ingot bars and cakes. For ingots an extra of 0.05c. per lb. is charged and there are other extras for other shapes. Cathodes are sold at a discount of 0.125c. per lb.

Quotations for zinc are for ordinary Prime Western brands. Quotations for lead reflect prices obtained for common lead, and do not include grades on which a premium is asked.

The quotations are arrived at by a committee consisting of the market editors of *Mining Journal-Press* and a special representative of the Bureau of Mines and the Bureau of Foreign and Domestic Commerce.

London

Dec.	Copper			Tin		Lead		Zinc	
	Standard		Electrolytic						
	Spot	3M		Spot	3M	Spot	3M	Spot	3M
11	64 3/8	65 3/8	68 3/4	256 1/4	259 3/8	41 1/4	39	36 1/16	36 1/8
12	64 7/8	65 7/8	69 1/4	259	262	41 3/4	39 1/4	36 3/8	36 3/8
15	65 5/8	66 3/4	70	258 3/4	262	42 3/4	39 5/8	37 1/16	37 1/16
16	65 5/8	66 5/8	70	261 1/4	264 1/2	42 1/2	39 5/8	37 5/8	37 5/16
17	65 5/8	66 3/4	70	260 1/2	264	42 5/8	39 1/4	37 3/8	36 15/16

The above table gives the closing quotations on the London Metal Exchange. All prices in pounds sterling per ton of 2,240 lb.

Silver, Gold, and Sterling Exchange

Dec.	Sterling Exchange "Checks"	Silver		Gold London	Dec.	Sterling Exchange "Checks"	Silver		Gold London
		New York	London				New York	London	
11	4.69 1/4	69 1/8	33 1/16	88s 8d	15	4.69	68	32 9/16	88s 9d
12	4.68	68 7/8	33 1/16	88s 9d	16	4.68 1/2	67 3/8	32 5/16	88s 9d
13	4.69	68 3/4	32 7/8	....	17	4.68 5/8	67 5/8	32 5/16	88s 10d

New York quotations are as reported by Handy & Harman and are in cents per troy ounce of bar silver, 999 fine. London silver quotations are in pence per troy ounce of sterling silver, 925 fine. Sterling quotations represent the demand market in the forenoon. Cables command one-quarter of a cent premium.

Metal Markets Have a Boom Week

New York, Dec. 17, 1924—The demand for copper, zinc, and lead during the last week has been phenomenal, and considerably higher prices have been realized for all three of these metals. Tin continues substantially unchanged, and silver has declined somewhat.

Record Tonnage of Copper Sold

Sales of copper during the last week eclipsed those of two weeks ago, seven sellers reporting a total of 59 000,000 lb. of domestic business in the five selling days which ended yesterday, with about 2,000,000 lb. additional sold early today. Practically all of this was for first-quarter delivery, and most of it was taken by Eastern brass, wire, and sheet mills. Scarcely any was taken by Middle-Western consumers. Although it was possible to get copper in several directions for 14¼c., delivered, last Thursday, a large tonnage was sold for 14⅜c. before the day closed, and the price has since advanced to 14⅝c., delivered. This figure was obtained for a substantial tonnage yesterday afternoon, and practically all sales today have been at this level. Domestic sales have somewhat overshadowed the foreign business for the week, but export sales have also been satisfactory. Naturally, copper producers are becoming very optimistic, and it is felt that the long-awaited 15c. level is not far distant. The American Brass Co. has made two revisions in its list prices during the week, present prices being considered as predicated on a 14¾c. copper market.

Zinc Reacts Slightly After Rapid Advance to 7.55c.

Enormous sales of zinc to galvanizers and brass mills, chiefly by two sellers, brought a rapid advance in zinc prices during the week. In fact, the price here has gone somewhat above that in London, and selling from the other side has probably been accountable for the reaction here to 7.45c. today. Earlier in the week, a good export business was done. Statistics of the American Zinc Institute for November were even better than expected. They showed:

Stock, Nov. 1, tons	38,452
Produced	42,633
Total	81,085
Shipped	54,173
Stock, Nov. 30	26,912
Shipped from plant for export	15,730
Stored for customers	876
Retorts operating Nov. 30	77,631

High-grade zinc has advanced to 8½c., delivered, sales being good.

Lead Scarce at Higher Prices

The official contract price for lead of the American Smelting & Refining Co. was advanced from 8.90 to 9.00c., New York, on Thursday, Dec. 11, and to 9.25c. on Monday, Dec. 15.

The amount of lead available for sale is not nearly equal to the demand, and fancy prices are quoted by dealers and others who have small quantities of the metal available for all comers, 10c. a lb. being the nominal quotation today in New York. The tonnage changing hands above the level set by the Smelting company is, however, very small, most of the metal going to consumers being on a contract basis. In the Middle West, the principal producer has not been so successful in stabilizing prices one-quarter cent below the New York level of the Smelting company, for fair-sized tonnages have also been sold at 9.65@9.75c. in the last three days. Demand is urgent from all classes of consumers, but no one has yet been forced to curtail his operations owing to a shortage of lead, so far as we know. There are several indications that substitutes for lead will be used should present prices persist.

The foreign market is even stronger than ever, foreign producers apparently being unable to keep up with the demand, though part of this is no doubt speculative. Lead in London has reached the equivalent of 9c.

Correction: A few issues of the *Mining Journal-Press* were printed last week with incorrect average prices for New York lead. The weekly average should have been stated as 8.817c.

Silver Recedes from Recent High

Lack of demand for silver from the Continent, purchases of gold by India to the detriment of silver, and sales by China are responsible for the recent fall in price. At the lower level the market appears quiet and steady.

Mexican Dollars—Dec. 11th, 53¼c.; 12th and 13th, 53c.; 15th, 52⅝c.; 16th, 51⅞c.; 17th, 52⅛c.

Tin in Moderate Demand

Consumers bought moderate tonnages of tin during the week, mostly for early shipment and at any indications of price concessions. Arrivals to Dec. 16 totaled 1,680 long tons.

Correction: In a few copies of *Mining Journal-Press* last week the price of Straits tin for Dec. 8 was erroneously printed. The correct figure was 54.875c.

Foreign Exchange Quiet

The foreign exchange market was quiet during the week, with slight irregular fluctuations. On Tuesday, Dec. 16, closing cable quotations were: francs, 5.39c.; lire, 4.31c.; and marks, 23.82c. Canadian dollars, ⅛ per cent discount.

Correction: Incorrect sterling exchange quotations appeared in a few copies of *Mining Journal-Press* mailed last week. The correct quotations are: Dec. 8, 4.69⅝; Dec. 9, 4.70¼.

Circulation Statement

Stock of money in the United States, Dec. 1, 1924 follows:

Gold coin and bullion	$4,570,067,375
Gold certificates	(1,423,047,259)
Standard silver dollars	510,642,851
Silver certificates	(425,319,664)
Treasury notes of 1890	(1,407,177)
Subsidiary silver	281,208,421
United States notes	346,681,016
Federal Reserve notes	2,246,739,030
Federal Reserve Bank notes	8,921,193
National Bank notes	774,148,557
Total, Dec. 1	$8,738,408,443

Amounts in parenthesis are not included in the total. Gold and silver stocks increased about $20,000,000 and notes in circulation decreased about $13,000,000 during November.

Other Metals

Quotations cover large wholesale lots unless otherwise specified.

Aluminum—99 per cent grade, 28c. per lb.; 98 per cent, 27c. London, £125 per long ton.

Antimony—Per lb.:
Chinese brands, 14¼c.
Cookson's "C" grade, 17⅞c.
Chinese needle, lump, nominal, 10c.
Standard powdered needle, 200 mesh, 11½c.
White oxide, Chinese, 99 per cent Sb_2O_3, 13@14c.

Bismuth—$1.50@$1.55 per lb. London, 6s.

Cadmium—60c. per lb. London, 2s. 2d.@2s. 6d.

Iridium—$325 per oz.

Nickel—29@30c. per lb. for 99 per cent virgin metal. Electrolytic, 33c.; London, £160 per long ton.

Palladium—$79@$83 per oz. Crude, $60@$65.

Platinum—$117 per oz. for refined. Crude, $111.

Quicksilver—$72@$74 per 75-lb. flask. San Francisco wires $71.35. Quiet. London, £11⅞.

The prices of **Cobalt, Germanium Oxide, Magnesium, Molybdenum, Monel Metal, Osmiridium, Osmium, Radium, Rhodium, Ruthenium, Selenium, Tantalum, Tellurium, Thallium, Tungsten,** and **Zirconium** are unchanged from the prices given in the Dec. 6 issue.

Metallic Ores

Tungsten Ore—Per unit, N. Y.:
Chinese wolframite, $8.85@$9.
High-grade Western scheelite, $9@$9.25.

Chrome, Iron Ore, Galena and **Pyrite Radio Crystals, Manganese, Molybdenum, Tantalum,** and **Vanadium Ores** are unchanged from Dec. 6 quotations.

Zinc and Lead Ores Higher

Joplin, Mo., Dec. 13, 1924

Zinc Blende	Per ton
High	$51.30
Premium, basis 60 per cent zinc	$51.00@$52.00
Prime Western, 60 per cent zinc	$50.00
Fines and slimes	$49.00@$44.50
Average settling price, all	$47.03
Lead Ore	
High	$127.20
Basis 80 per cent lead	$125.00
Average settling price, all	$122.02

Shipment for the week: Blende, 17,233; lead, 3,556 tons. Value, all ores the week, $1,244,520.

Buying this week exceeded that of two weeks ago, a total of 21,360 tons being contracted for early shipment, the bulk of which sold on $50 basis.

Available unsold ore is now estimated at less than 15,000 tons, and of the purchase made today it is estimated that more than 5,000 tons is contracted ahead of production.

Platteville, Wis., Dec. 13, 1924

Zinc	Per ton
Blende, basis 60 per cent zinc	$49.50
Lead	
Lead, basis 80 per cent lead	$125.00

Shipments for the week: Blende, 902 tons; lead, 80 tons. Shipments for the year: Blende, 30,774; lead, 1,506 tons. Shipments for the week to separating plants, 1,420 tons blende.

Non-Metallic Minerals

Barytes—f.o.b. Kings Creek, S.C.
Crude, $6.50@$8 per gross ton.
Ground, off color, $13 per ton.
White, bleached, $17 per ton.
Water ground, 300 mesh, bags included, $21 per ton, Charlotte, N. C.

Bauxite — American, f.o.b. shipping point per gross ton:
Crushed and dried, $5.50@$8.75.
Pulverized and dried, $14.
Calcined, crushed, $19@$20.
Foreign per metric ton, c.i.f.:
French red, $5@$7.
Adriatic, low SiO_2, $5@$7.50.

Mica—Madagascar amber, dark, free from iron, per lb., f.o.b. New York:

No. 1	$2.75	No. 4	$0.75
No. 2	2.25	No. 5	.50
No. 3	1.35	No. 6	.30

Other mica prices in Dec. 6 issue.

Amblygonite, Asbestos, Barytes, Beryl, Borax, Celestite, Chalk, China Clay, Corundum, Diatomaceous Earth, Emery, Feldspar, Fluorspar, Fuller's Earth, Garnet, Gilsonite, Graphite, Gypsum, Ilmenite, Iron Oxide, Lepidolite, Limestone, Magnesite, Manjak, Monazite, Ocher, Ozocerite, Phosphate, Potash, Pumice, Pyrites, Quartz Rock Crystals, Rutile, Silica, Spodumene, Sulphur, Talc, Tripoli, and **Zircon** are unchanged from Dec. 6 prices.

Mineral Products

Arsenious Oxide (white arsenic)—6½@6¾c. per lb.

Copper Sulphate, Sodium Nitrate, Sodium Sulphate, and **Zinc Oxide** are unchanged from Dec. 6 prices.

Ferro-Alloys

Ferromanganese—Domestic, German, and English, $105 per gross ton, f.o.b. works, or duty paid at seaport.

Ferrocerium, Ferrochrome, Ferromolybdenum, Ferrosilicon, Ferrotitanium, Ferrotungsten, Ferro-uranium and Ferrovanadium are unchanged from the prices given in the Dec. 6 issue.

Metal Products

Rolled Copper — Sheets, 22½c. base; wire, 16½c.

Nickel Silver—18 per cent Grade A sheets, 28¾c. per lb.

Yellow Metal—Rods, 16⅞c., sheets, 19¾c. per lb.

Lead Sheets—Full, 13c.; cut, 13¼c. per lb.

Zinc Sheets—10¾c. per lb.

Refractories

Bauxite Brick, Chrome Brick, Firebrick, Magnesite Brick, Magnesite Cement, Silica Brick, and **Zirkite** are unchanged from Dec. 6 prices.

Pig Iron and Coke Advance

Pittsburgh, Dec. 16, 1924.

There is no indication that there will be the usual holiday lull. Bars, shapes, plates, sheets and wire products are all higher than a month ago. It was only in the last week that the sheet market worked fully up to the advanced level, 2.70c. for blue annealed, 3.60c. for black, and 4.75c. for galvanized and automobile sheets.

Steel production represented 71.6 per cent of capacity for November against 66.4 per cent for October.

Pig Iron—Bessemer and foundry are up 50c. as shown by transactions; basic has been inactive and is thus nominal. Bessemer, $21.50; basic, $20 @ $20.50; foundry, $21 @ $21.50, f.o.b. Valley furnaces.

Connellsville Coke — Independent operators suddenly decided yesterday to advance to the Frick wage scale, effective today. The advance on most of the jobs is close to 50 per cent. First-quarter furnace coke contracts were written at advancing prices, $3.25 @$4, with a wage clause whereby actual prices will average 60@90c. more than written. The spot market, previously $3.50@$3.65, will presumably develop prices around $4.25 or $4.50, with spot foundry at $5@$5.50.

The Rise in Metal Prices

By Felix Edgar Wormser
Assistant Editor

SINCE ELECTION DAY the non-ferrous metal markets have shown surprising strength. Prices of copper, lead, and zinc have risen steadily, with here and there a minor reaction, and give promise of finishing the year in strong positions and at the highest level of 1924. The encouraging feature of the markets has been the fact that these metals have moved upward mainly on the strength of substantial buying in the United States and Europe and not by the force of manipulation or speculation, although speculation, as always, has been a factor.

When, as recently, 60,000,000 lb. of copper is purchased in five days, and 7,000 tons of Prime Western slab zinc, while producers find themselves unable to meet the insistent demand for lead, no other evidence is needed that the metal markets are doing well. Metal consumption has been splendid lately. So far as the United States is concerned, only small amounts of metals have gone into speculative hands, but in Europe, where ample facilities are offered anyone who wishes to speculate in the metals, much speculative buying has occurred, but not enough, however, to obscure the fact that consumption of the metals in Europe has also taken an upturn, with the tendency that it will grow.

Briefly what is the situation in each metal? In copper the significant thing to remember is that European consumption has not kept pace with the growth in the consumption of copper in the United States. Whereas copper and brass manufacturers in the United States used 98 per cent more copper in 1923 than in 1913, consumers in Europe have actually taken less than in pre-war periods. It is unreasonable to suppose that the growth of industries in Europe should cease while those of the United States continue to expand. Signs are not wanting that European countries will take the proportion of the world's production which should be their share. Already in 1924 the net imports of copper by United Kingdom averaged 9,770 tons per month, compared with 6,848 tons in 1923; the average for France was 11,189, compared with 9,000 tons in 1923, and for Germany only 6,032 tons, compared with 5,926 tons in 1923. A great increase in German consumption may be looked for, as Germany has always been considered the best foreign customer of American copper producers and should soon resume that position. In the last few weeks German buying has been an important event in the London and New York markets, so that an improved consumption in Germany is already in prospect. With more stable political conditions in Germany this is to be expected.

Copper production can be increased both in the United States and other countries. Should prices advance and become firmly established at a higher level, a higher rate of production may be anticipated. However, Europe should have no difficulty consuming increased quantities of the metal. Production of blister copper in the United States in November amounted to 79,515 tons, according to the American Bureau of Metal Statistics, a decrease from October, when the total was 85,885 tons. Stocks of blister and refined in North and South America when last reported—on Oct. 1—amounted to 370,498 tons. Net exports of copper from the United States have been about 22,000 tons each for September and October. Copper at 14⅝c. is still cheap. It could stand an advance of 50 per cent and more without being out of line with other commodities.

The question "When will the price of lead overtake that of copper?" doesn't seem so much of a joke with lead being held for 10c. in New York and the market showing a rising tendency. Lead is worth more today than since 1917. It is scarce and firmly held, and continues to be much in demand, but if prices should advance much further, doubtless some consumers may find a way of getting along without it, or with smaller quantities. Substitution by other metals would be undesirable, but probably has already occurred to at least a limited extent. The tight market condition is bringing about its own corrective in the most natural manner possible—an advance in the price of lead. The market will move higher until either consumption falls off or added production meets the demand. The present situation is nothing unusual in the lead market and has taken place several times in the last few years. Some important producers have tried to stem these sharp rises in lead by accumulating stocks at lower prices and selling them when the market became pinched, as now. But generally the stocks acquired have not been large enough to do that, nor are they large enough today.

A 9c. lead market may be considered a high level. It is seldom that lead has been able to remain above 9c. for long. One has to go as far back as 1917 to find any year in which lead was able to stay above 9c. for several months. Generally, the market moves steadily upward to a peak and then drops gradually. Lead output of the United States will total about 610,000 tons from domestic ores in 1924, an increase over the production of 1923, when it amounted to 567,700 tons. This will be a record production, but still not enough to satisfy the demand.

Europe's function in the present lead market has been important. It has drawn the entire Mexican bullion production and most of the bonded lead in the United States. In the last few weeks the strong demand for lead in Europe has been chiefly responsible for the rapid rise in prices. The New York and London prices are not far apart, although quotationally they could be separated by 2½c. per lb., the full extent of the protective tariff. Not only have Germany, France, and other countries contracted for Mexican lead, but they have also taken the bulk of Spanish and Australian production. Both of these sources are not nearly so productive as in former years, partly because of depleted mines and partly on account of labor troubles, especially in Australia. Australian output is about 12,500 tons per month, Spanish, 7,100 tons, and Mexican, 15,000 tons.

Zinc is another metal which owes its present improved position largely to the good demand for the metal from Europe. The records of the American Zinc Institute for November show that 15,730 tons of zinc was shipped from plant for export purposes. This is a record figure. As production amounted to 42,633 tons, this export movement absorbed about 37 per cent of the domestic production, an unusual condition. Europe is evidently not coming to the United States for concentrates, but for the finished product. Stocks on hand, Dec. 1, 1924, amounted to, 26,912 tons, or only about two to three weeks' supply. Besides the gratifying demand from Europe galvanizers in the United States have bought heavily of the domestic market, in some cases contracting right through 1925 for shipments on a fixed price for the entire order. The Orient has also bought Prime Western metal in the American market—another unusual circumstance, as the Australian production has generally provided for the Oriental demand. Sales of American zinc producers in November and December have been the heaviest of the year. It may be that the large amount of forward business which was contracted will decrease purchases later, but should the demand from galvanizers continue good, the future business will not have any detrimental effect on prices and may help to stabilize the market. Production in the Picher area in the Middle West can be increased and probably will be if prices advance to higher levels, but the augmented output should be readily absorbed.

Joplin Zinc Ore Market for 1923-1924

The following data compares conditions in the Joplin zinc ore market for the first eleven months of 1923 and 1924:

Blende, Tons, Comparison of 1924 with 1923

	Production	Purchase	Shipment	Stock End of
11 months, 1924	656,710	606,350	672,980	37,120
11 months, 1923	594,030	566,090	609,500	53,320
Increase	62,680	39,660	63,480	
Decrease				16,200
Shipment of 11 months, 1924				672,980
Production, 11 months, 1924				656,710
Decrease of stock				9,990

Ore Prices	Blende Premium	Prime Western	Fines and Slimes	Metal Nov. Avgi
End of Nov., 1924	$48@ $49.00	$47.00	$46@$42	6,796
End of Nov., 1923	42@ 42.50	41@41.50	41@ 39	6,347

Comparative prices	First Week in December 1924	1923
Blende basis, premium	$48@ $49	$41.50
Blende, Prime Western	47	40.50@41
Blende, fines and slimes	46@ 43	40@38.50
St. Louis slab zinc, avg. cents	7.050	6.340

Mining Stocks

Week Ended December 13, 1924

Stock	Exch.	High	Low	Last	Last Div.
COPPER					
Alaska-Br. Col.	N. Y. Curb	*6	*6	*6	
Anaconda	New York	43⅛	40½	42	De.15, Ja.21, Q 0.75
Arcadian Consol.	Boston	1	1	1	
Ariz. Com'l.	Boston	11⅜	11⅛	11⅛	Jy.19, Jy.31 0.50
Calaveras	N. Y. Curb	2⅛	2	2	
Calumet & Arizona	Boston	*55	*52½	*52½	De.5, De.22 Q 0.50
Calumet & Hecla	Boston	18⅛	16½	16	My. 31, Jn. 16 0.50
Canario Copper	N. Y. Curb	4⅛	4⅛	4⅛	
Cerro de Pasco	New York	52	49⅛	51	Oc. 23, No. 1 1.00
Chile Copper	New York	34⅞	33⅜	34⅛	De.3, De.29, Q 0.62½
Chino	New York	28⅛	27	27⅛	Sept., 1920 0.37½
Con. Coppermines	N. Y. Curb	3⅛	3	3	
Copper Range	Boston	28	26½	27	May, 1923 1.00
Crystal Copper	Boston Curb	*60	*56	*58	
Davis-Daly	Boston	*45	*30	*45	Mar., 1920 0.25
East Butte	Boston	4⅛	4⅛	4⅛	Dec., 1919 0.50
First National	Boston Curb	*34	*32	*34	Feb., 1919 0.15
Franklin	Boston	*55	*40	*50	
Gadsden Copper	Boston Curb	*56	*56	*56	
Granby Consol.	New York	18⅞	17⅛	17⅛	May, 1919 1.25
Greene-Cananea	New York	17⅛	17	17	Nov., 1920 0.50
Hancock	Boston	*80	*80	*80	
Howe Sound	N. Y. Curb	2⅛	2⅛	2⅛	Ap.1,Ap.15, Q 0.05
Inspiration Consl.	New York	30⅞	29⅛	30⅛	De.20, Ja.7, Q 0.50
Iron Cap	Boston Curb			2	May, 1923 0.15
Isle Royale	Boston	*18⅛	*17⅛	*17⅛	Se. 1, Se. 15 0.50
Jerome Verde Dev.	N. Y. Curb	*99	*99	*99	
Kennecott	New York	54⅛	50½	54	De.2, Ja.2, Q 0.75
Keweenaw	Boston	*95	*80	*80	
Lake Copper	Boston	1⅛	1⅛	1⅛	
Magma Copper	New York	38⅛	36⅛	37⅛	Jan., 1919 0.50
Mason Valley	N. Y. Curb	1⅛	1⅛	1⅛	
Mass Consolidated	Boston	1	⅞	⅞	Nov., 1917 1.00
Miami Copper	New York	23⅛	22⅛	22⅛	No.1 No.15 Q 0.50
Mohawk	Boston	37⅛	35	35⅛	Se. 22, Oc. 13 1.00
Mother Lode Coa.	New York	8⅛	8⅛	8⅛	D. 12, De. 31 0.37½
Nevada Consol.	New York	15⅛	15	15	Sept., 1920 0.25
New Cornelia	Boston	23	21⅛	22⅛	No. 7, No. 24 0.25
New Dominion	N. Y. Curb			2⅛	
North Butte	Boston	2⅛	2 3/16	2 3/16	Oct., 1918 0.25
Ohio Copper	N. Y. Curb	1 1/16	1 1/16	1⅛	No.14, De. 2 0.05
Old Dominion	Boston	24	23	23	Dec., 1918 1.00
Phelps Dodge	Open Mar.	†104	†100		De.2, Ja.2 Q 1.00
Quincy	Boston	24	22⅛	23⅛	Mar., 1920 1.00
Ray Consolidated	New York	17⅛	15⅞	16⅛	Dec., 1920 0.25
Ray Hercules	N. Y. Curb	*15	*12	*15	
St. Mary's Min. Ld.	Boston	38	36	37⅛	Ap.22, My.20 3.00
Seneca Copper	New York	1⅛	1⅛	1⅛	
Shannon	Boston	1⅛	*90	1	Nov., 1917 0.25
Shattuck Arizona	New York	7⅛	6⅞	7⅛	Jan., 1920 0.25
Superior & Boston	Boston	1⅛	1⅛	1⅛	
Tenn. C. & C.	New York	8⅛	8⅛	8⅛	De.31, Ja.15,Q 0.25
United Verde Ex.	N. Y. Curb	28⅛	28	28⅛	Oc. 3, No. 1 0.50
Utah Copper	New York	85⅛	83⅛	84	De.12, De.31,Q 1.00
Utah Metal & T.	Boston	*30	*25	*25	Dec., 1917 0.50
Victoria	Boston			1	
Walker Mining	N. Y. Curb	3⅛	3 3/16	3⅛	
Winona	Boston	*30	*30	*30	
NICKEL-COPPER					
Internat. Nickel	New York	24⅛	22⅛	23⅛	March, 1919 0.50
Internat. Nickel pfd.	New York			94⅛	Oc.16, No.1, Q 1.50
LEAD					
Carnegie Lead & Zinc	Pittsburgh	4	3⅛	4	
National Lead	New York	161⅛	156	158	De.12, De.31, Q2.00
National Lead pfd.	New York	116⅛	116⅛	116⅛	No.21,De.15, Q 1.75
St. Joseph Lead	New York	40	38⅛	40	De. 9, De. 20 0.50
ZINC					
Am. Z. L. & S.	New York	11	9⅛	10⅞	May, 1920 1.00
Am. Z. L. & S. pfd.	New York	34⅛	30⅛	34⅛	Nov., 1920 1.50
Butte C. & Z.	New York	9	7⅛	8	De.10, De.24 0.50
Butte & Superior	New York	20⅞	18⅛	20⅛	June, 1924 0.50
Callahan Zn-Ld.	New York	4⅛	3⅛	4⅛	Dec., 1920 0.50
New Jersey Zn.	N. Y. Curb	194	175	192	Oc.,No.,'24 QX 4.00
United Zinc	N. Y. Curb	*35	*20	*20	
Yellow Pine	Los Angeles	*68⅛	*59⅛	*59⅛	De.10, De.15 Q 0.4
SILVER					
Alvarado	Boston Curb			1⅞	
Beaver Consol.	Toronto	*24⅞	*21	*24⅛	May, 1920 0.03
Castle-Trethewey	Toronto	*73⅛	*71	*73	
Coniagas	Toronto	2.30	2.25	2.25	Ap.20, My.1 0.02½
Crown Reserve	Toronto	*49	*48⅛	*48⅛	Jan., 1917 0.05
Keeley	Toronto	2.07	2.03	2.05	Sept. 15, SA 0.12
Kerr Lake	N. Y. Curb			2	Oc. 1, Oc. 15, 0.12½
La Rose	Toronto	*7	*7	*7	Apr., 1922 0.10½
Lorrain Trout Lake	Toronto	1.35	1.34	1.34	
McKinley-Dar.-Sav.	Toronto	*15⅛	*13⅞	*15	Oct., 1920 0.03
Mining Corp. Can.	Toronto	2.60	2.54	2.57	Sept., 1919 0.12½
Nipissing	N. Y. Curb	6⅛	6⅛	6⅛	Oc.1,Oc.20,QX 0.30
Ontario Silver	New York	6⅛	6⅛	6⅛	Jan., 1919 0.50
Temiskaming	Toronto	*19⅛	*19⅛	*19⅛	Jan., 1920 0.40
GOLD					
Alaska Gold	New York	*12⅛	*12⅛	*12⅛	
Alaska Juneau	New York	1	1	1	
Argonaut	Toronto	*29	*21	*23⅛	
Carson Hill	Boston	*70	*50	*70	
Consol. W. Dome L.	Toronto	14.50	14.36	14.49	
Cresson Consol. G.	N. Y. Curb	3⅛	3⅛	3⅛	De.31, Ja.10 Q 0.50
Dome Mines	New York	13⅛	13⅛	13⅛	De.31, Ja.20, Q 0.50
Golden Cycle	Colo. Springs			1.37	My.31, Jn.10 Q 0.03
Hollinger Consol.	Toronto	14.55	14.45	14.50	De.11, De.31, 0.05
Homestake Mining	New York	42⅛	42	42	De.11, De.26, M0.50
Jib, Cons l	N.Y. Curb	*59	*50	*56	
Kirkland Lake	Toronto	*28⅜	*25½	*28½	
Lake Shore	Toronto	4.48	4.15	4.45	De.1,De.15,QX 0.10
McIntyre-Porcupine	New York	14⅞	14⅛	14⅛	No. 1, De. 1 0.25
Newray	Toronto	*24⅛	*24	*24	
Night Hawk Pen.	Toronto			*4	
Portland	Colo. Springs	*46⅛	*44⅛	*44⅛	Oct., 1920 0.01
Teck-Hughes	Toronto	1.14	1.12	1.13	
Tom Reed	Los Angeles	*23	*21⅛	*21⅛	Dec., 1919 0.02
Tough-Oakes	Toronto	*37	*35	*35⅛	
United Eastern	N. Y. Curb	*42	*38	*42	Jy.18, Jy.31, Q 0.05
Vipond Cons.	Toronto	1.29	1.25	1.27	
Wright-Hargreaves	Toronto	4.00	3.94	3.98	De.15, Ja.2,QX 0.05
GOLD AND SILVER					
Black Oak	N. Y. Curb			*89	
Con. Cortez	N. Y. Curb	*10	*10	*10	
Con. Virginia	San Francisco	7⅛	5⅛	5⅛	
Continental Mines	N. Y. Curb			1⅛	
Dolores Esperanza	N. Y. Curb			*31	Jy.1, Jy.10 Q 0.05
Premier Gold	N. Y. Curb	2⅛	2 3/16	2⅛	De.22, Ja.5,QX 0.10
Tonopah Belmont	N. Y. Curb	*53	*53	*53	Apr., 1923 0.05
Tonopah Divide	N. Y. Curb	*20	*20	*20	Se. 22, Oc. 10 0.10
Tonopah Extension	N. Y. Curb	3 1/16	2 3/16	2⅛	De.11, Ja.1 0.05
Tonopah Mining	N. Y. Curb	1⅛	1⅛	1⅛	Se.20, Oc.31 0.07½
Unity Gold	N. Y. Curb	*75	*56	*65	
West End Consol.	N. Y. Curb	*46	*46	*46	Mar., 1923 0.05
Yukon Gold	N. Y. Curb			*50	June, 1918 0.02
SILVER-LEAD					
Ahumada	Boston Curb	7⅛	6⅞	7	De.15, Ja.2, X 0.15
Bingham Mines	Boston	26	21	25⅛	De.20, Ja.2 0.50
Cardiff M. & M.	Salt Lake	1	1	1	De.16, No.18 0.10
Chief Consol.	Boston Curb	4⅛	3⅛	4	Ap.19, My.1,Q 0.10
Columbus Rexall	Salt Lake	*27	*26⅛	*27	Aug., 1920 0.03
Consol. M. & S.	Montreal	49⅛	44	48	De.11, Ja.15 0.75
Daly Mining	Salt Lake			1.50	July, 1920 0.10
Erupcion	Boston Curb	2⅛	2⅛	2⅛	De.15, Ja.2, X 0.15
Federal M. & S.	New York	18⅛	17⅛	17⅛	Jan., 1909 1.50
Federal M. & S. pfd.	New York	59⅛	57	58	No.25, De.15, 1.75
Florence Silver	Spokane	5⅛	5	5⅛	Apr., 1919, QX 0.01
Hecla Mining	N. Y. Curb	*10	*9⅛	*10	No.15, Dn.15 0.25
Iron Blossom Con.	N. Y. Curb	*33	*27	*28	Oc.25, 1924 0.02½
Marsh Mines	N. Y. Curb			*4	June, 1921 0.02½
Park City	Salt Lake	5	5	5	Dec. 15, 1924 0.15
Park Utah	N. Y. Curb			3⅛	Mc. 15, Ap. 1 0.15
Prince Consol.	Salt Lake	*14	*12	*14	
Silver King Coa.	Salt Lake			5.10	Oct., 1924 0.15
Silversmith	Spokane	*30	*28	*29	Oc. 1, Oc. 10 0.01
Tamarack-Custer	Spokane	1.36	1.28	1.28	Se. 22, Se. 29 0.25
Tintic Standard	Salt Lake	9.00	8.75	8.72	Se. 1, '24, X 0.25
Utah-Apex	Boston	3⅛	3 1/16	3⅛	Se.5, Se.15, Q 0.25
IRON					
Bethlehem Steel	New York	49⅛	47⅛	48⅛	Jn.1, Jy.1, Q 1.25
Char. Iron	Detroit	*25	*25	*25	
Char. Iron pfd.	Detroit	*80	*78	*78	
Colorado Fuel & Iron	New York	40⅛	37⅛	40	Au.11, Au.25,Q 2.00
Col. Fuel & Iron pfd.	New York			108⅛	No.10, No.26 Q 2.00
Gt. North'n Iron Ore	New York	35	32⅛	34⅛	De.10, De.27 2.00
Inland Steel	N. Y. Curb			4	No.14, De.1, Q 0.62½
Mesabi Iron	N. Y. Curb			2⅛	
Replogle Steel	New York	22	19	21⅛	
Republic I. & S.	New York	57⅛	52⅛	56	May, 1921 1.50
Republic I. & S. pfd.	New York	36⅛	36⅛	36⅛	De.16, Ja.2, Q 1.75
Sloss-Sheffield S. & I.	New York	81	78⅛	80	Se.11, Se.20, Q 1.50
Sloss-Shef. S.&I. pfd.	New York	96	95	96	De.20, Ja.2, Q 1.75
U. S. Steel	New York	118⅛	115⅛	117⅛	No.29,De.3, QX 1.75
U. S. Steel pfd.	New York	121⅛	121	121	No.4, No.29, Q 1.75
Virginia I. C. & C.	New York			45	De.15, Ja.2 1.50
Virginia I.C.&C.pfd.	New York			78⅛	De. 13, Ja. 2, Q 2.50
VANADIUM					
Vanadium Corp.	New York	29⅛	27	28⅛	Jan., 1921 1.00
ARSENIC					
Western Utah Copper	N. Y. Curb	*17	*15	*15	
ASBESTOS					
Asbestos Corp.	Montreal	38	31	38	Se.29, Oc.15 Q 1.00
Asbestos Corp. pfd.	Montreal	73	69	73	Oc.1, Oc.15, Q 1.50
SULPHUR					
Freeport Texas	New York	10⅞	9⅛	10⅞	Nov., 1919 1.00
Texas Gulf	New York	93⅞	88⅛	93⅛	De.1,De.15, QX 2.25
PLATINUM					
So. Am. Gold & P.	N. Y. Curb	4⅛	3⅛	4	
MINING, SMELTING AND REFINING					
Amer. Metal	New York	51⅛	49⅛	50	No.19, De.1 Q 0.75
Amer. Metal pfd.	New York	114⅛	114⅛	114⅛	No.20, De.1, Q 1.75
Amer. Sm. & Ref.	New York	88⅛	85	87⅛	Oc.17, No.1, Q 1.25
Amer.Sm.&Ref.pfd.	New York	105⅛	104⅛	105	No.17, De.1 Q 1.75
U. S. Sm. R. & M.	New York	37⅛	34⅛	35⅛	Jan., 1921 0.50
U.S. Sm. R.&M.pfd.	New York	46	44⅛	46	Oc.9, Oc.15 Q 0.87

* Cents per share. † Bid or asked. Q, Quarterly. SA, Semi-annually. M Monthly. K, Irregular. I, Initial. X, Includes extra. The first date given is that of the closing of the books; the second that of the payment of the dividend.

Boston quotations courtesy Boston Stock Exchange; Toronto quotations those of the Standard Stock Exchange of Toronto, by courtesy of Arthur E. Moysey & Co.; Spokane, Pohlman Investment Co.; Salt Lake, Stock and Mining Exchange; Colorado Springs, Colorado Springs Stock Exchange.